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**General**

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## Preface

P.1 Scope

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**Note:** This Preface is not normative, it is for information only.

**Preface**P.1 **Scope**

VIDEO CD is a reproduction system to present full motion pictures with associated audio by using the Compact Disc format. The system uses the ISO MPEG1 standard definitions to compress the video and audio information, the results are: full screen and full motion pictures together with associated high quality audio.

A VIDEO CD disc can contain more than 70 minutes of high quality audio and video programs. The VIDEO CD disc can optionally contain high quality still pictures with associated audio and a play-list to control the pre-programmed sequences of still and motion pictures.

The VIDEO CD format is based on the CD Bridge disc format. By using the CD Bridge disc concept, VIDEO CD discs can be played on CD-I, CD-ROM XA, VIDEO CD players, and other hardware and software platforms. This is a direct consequence of the ability of a CD Bridge disc to include application programs for a variety of platforms.

Preface

P.1 Scope

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**Chapter I Conformance and Conventions****I.1 Conformance**

VIDEO CD conforms to the mandatory requirements specified in this document. All parts in this document are mandatory unless they are specially defined as recommended or optional or informative.

VIDEO CD also conforms to the applicable parts of the system descriptions or international standards that are listed below:

- CD-DA: Compact Disc Digital Audio, specified in the System Description Compact Disc Digital Audio ("Red Book"), N.V. Philips and Sony Corporation.
- CD-ROM: Compact Disc Read Only Memory, specified in the System Description Compact Disc Read Only Memory ("Yellow Book"), N.V. Philips and Sony Corporation.
- CD-I: Compact Disc Interactive, specified in the CD-I Full Functional Specification ("Green Book"), N.V. Philips and Sony Corporation, March 1993.
- CD-ROM XA: Compact Disc Read Only Memory eXtended Architecture, specified in the System Description CD-ROM XA, N.V. Philips and Sony Corporation.
- CD Bridge: Compact Disc Bridge, specified in the document "AN INTRODUCTION TO CD-I BRIDGE DISC", N.V. Philips and Sony Corporation, October 1991.
- ISO 9660: Information processing - volume and file structure of CD-ROM for information interchange. Ref. No. ISO 9660 : 1988 (E).
- ISO 646: Information processing - ISO 7-bit coded character set for information interchange. Ref. No. ISO 646 : 1983 (E).
- ISO 8859-1: Information processing - ISO 8-bit single byte coded graphic character sets. Part I: Latin alphabet No. 1. Ref. No. ISO 8859-1 : 1987 (E).
- ISO 2022: Information processing - ISO 7-bit and 8-bit coded character sets - coded extension techniques. Ref. No. ISO 2022 : 1986 (E).
- ISO 11172: Information technology - Coding of moving pictures and associated audio for digital storage media up to about 1,5 Mbit/s ("MPEG standard"). Ref. No. ISO DIS 11172 : 1992 (E).
- ISO 3901: Documentation - International Standard Recording Code (ISRC). Ref. No. ISO 3901-1986 (E).
- ISO 3166: Codes for the representation of names of countries. Ref. No. ISO 3166 : 1988 (E/F).
- EIA-608: Recommended Practice for Line 21 Data Service.

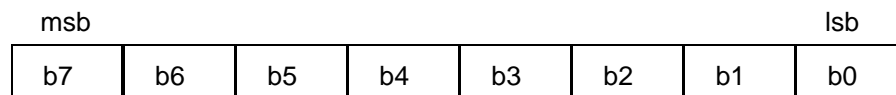
**I.2 Conventions**

Unless otherwise indicated in this document the conventions used are as follows:

**Bit ordering**

The graphical representation of all multiple-bit quantities is such that the most significant bit (msb) is on the left and the least significant bit is on the right.

Figure I.1      **Example of bit ordering for one 8 bits byte**



The most significant bit is the bit with the highest bit position number.

**Bit designation**

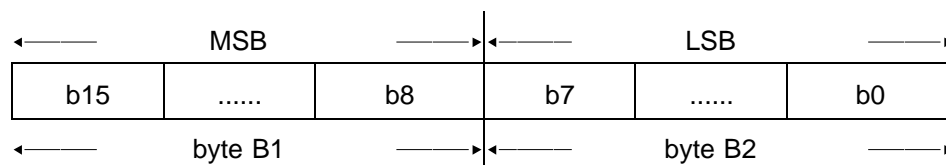
Bit#i denotes the bit with bit position i, according to Figure I.1.

**Byte ordering**

Quantities which require more than 8 bits for their representation are held in more than one byte on the disc. For all such quantities, the ordering of bytes on the disc (as seen at the interface to the disc driver) is such that the Most Significant Byte (MSB) is first and the Least Significant Byte (LSB) is last.

Multiple-byte quantities are represented graphically such that the left-hand-most or upper-most byte is most significant and the right-hand-most or lower-most byte is least significant.

Figure I.2      **Example of byte ordering for 2 bytes**



The most significant byte is the byte with the lowest byte position number.

**Byte designation**

Byte#i denotes the byte with byte position i, according to Figure I.2.

**Strings**

Strings are always given between double quotation marks, p.e. "\_\_\_\_\_".

**Hex**

All Hexadecimal values are preceded by a \$. The most significant nibble is on the left, the least significant nibble is on the right.

**Binary**

All Binary values are preceded by a %. The most significant bit is on the left, the least significant bit is on the right. A Binary value is represented by a 0, 1 or x where x is a 0 or a 1.

**Decimal**

All Decimal values are preceded by a blank space or the range indicator (..) when included in a range. The most significant digit is on the left, the least significant digit is on the right.

**Units of measure**

1K denotes 1024 units.

**Range**

Constant\_1..Constant\_2 or (Constant\_1..Constant\_2) denotes the range from and including Constant\_1 up to and including Constant\_2, in increments of 1.

**Ordering within tables**

The items within a table are contiguous, starting with the top line from the left to the right item, then the next line from the left to the right item, and so on, down to and including the bottom line from the left to the right item.

**Multiplication**

Multiplication of two values is denoted by a \*.

**Sector**

Wherever the word "Sector" is used in this document it has the identical meaning as the word "Block" in the CD-ROM system description.

**Sector, Subcode address**

All Sector addresses and Subcode addresses are represented in the form mm:ss:ff. The Minutes field is represented by "mm", the Seconds field is represented by "ss", the Blocks (Sector) or Frames (Subcode) field is represented by "ff".



## **Chapter II      General Disc Format**

### **II.1      General**

This chapter gives the specification of the general format of the VIDEO CD disc.

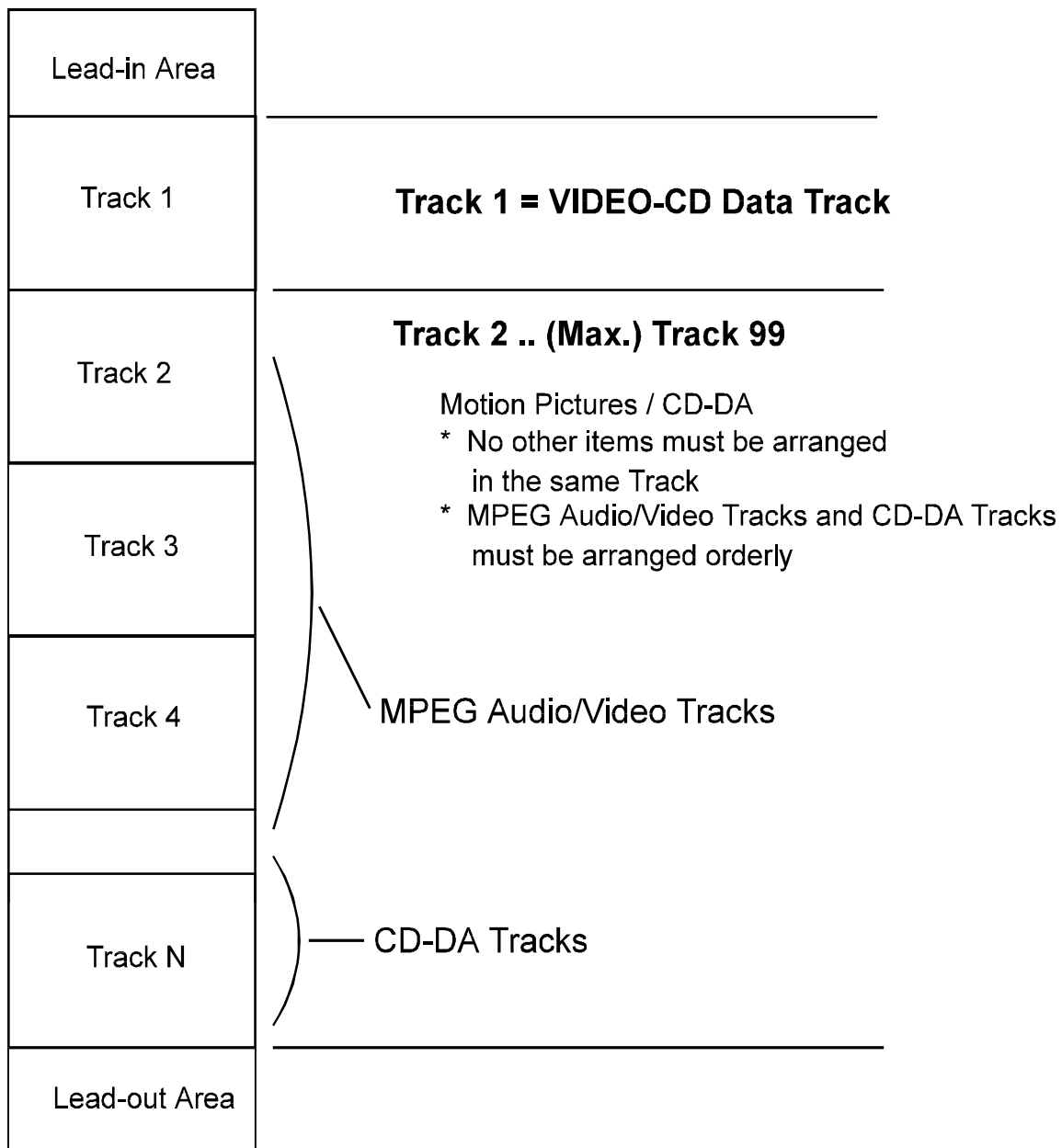
The VIDEO CD disc conforms to the CD Bridge specification.

The structure and organization of the physical areas on a VIDEO CD disc are described in Chapter II.2 "Disc Organization".

**II.2 Disc Organization**

The VIDEO CD disc organization conforms to the System Descriptions as listed in Chapter I.1 "Conformance", extended or modified as specified in this section. An example of the general layout of a VIDEO CD disc is given in Figure II.1

Figure II.1 **Example of the disc layout**



### 2.1 Lead-in and Lead-out Areas

The Lead-in and Lead-out Areas are encoded as CD-ROM XA Data Tracks containing Empty Sectors of Mode 2 Form 2.

The Subheader of all Lead-in and Lead-out Area Sectors is defined as:

- File Number equals 0.
- Channel Number equals 0.
- Submode byte equals \$20.
- Coding Information byte equals \$00.

If the last track is a CD-DA track, it is permitted to encode the Lead-out area as an Audio track.

### 2.2 Program Area

A VIDEO CD disc contains as the first Track a Special VIDEO CD Data Track. This first Track is followed by one or more MPEG Audio/Video Tracks. These MPEG Audio/Video Tracks each contain one playable sequence with MPEG Video Data and MPEG Audio Data. On a VIDEO CD disc only MPEG Audio/Video Tracks and CD-DA tracks are allowed for Track two and higher. A general description of the VIDEO CD disc is given in the Video CD Information Area. For Karaoke use, a description of the contents of the MPEG Audio/Video Tracks can be given in the optional Karaoke Basic Information Area in the first Track of the disc.

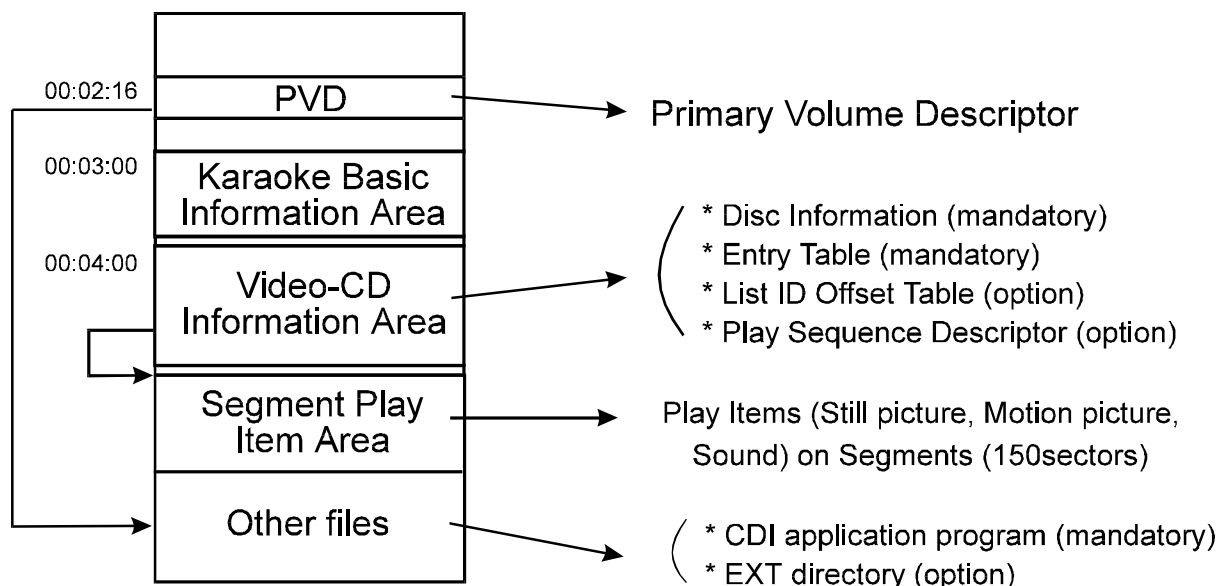
### 2.3 Special VIDEO CD Data Track

The first Track of a VIDEO CD disc is defined as follows:

- Track Number equals one.
- Contains the ISO 9660 file structure.
- Contains a CDI application program.
- As an option can contain the Karaoke Basic Information Area with Karaoke information on the VIDEO CD disc.
- Contains the Video CD Information Area with general information on the VIDEO CD disc.
- As an option can contain the Play Sequence Descriptor and the List ID Offset Table.
- As an option can contain the Extended Play Sequence Descriptor and the Extended List ID Offset Table.
- As an option can contain the Segment Play Item Area containing MPEG Still Pictures, MPEG Motion Pictures and MPEG audio.

Figure II.2 gives an example of the layout of Track 1.

Figure II.2 Example of the layout of Track 1



### 2.3.1 Volume Descriptors

The Volume Descriptors as specified in CD Bridge have to be present. The Application Identifier of the PVD contains the Path name of the CDI application program.

### 2.3.2 Karaoke Basic Information Area

A VIDEO CD disc as an option can contain the Karaoke Basic Information Area.

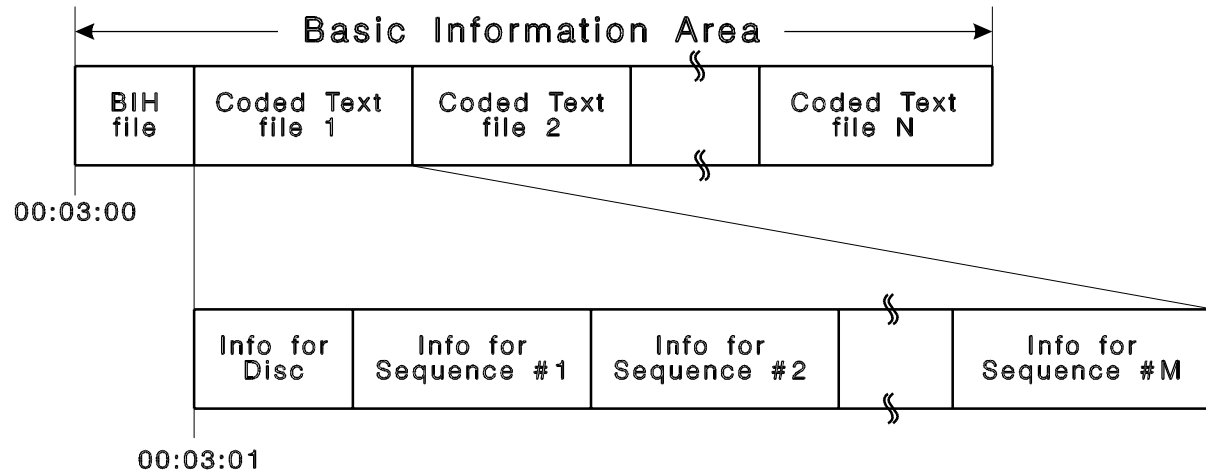
The data in the Karaoke Basic Information Area provides basic information to produce a quick reference table of the Karaoke music programs on the disc.

The Karaoke Basic Information Area is composed from a Basic Information Header ("KARINFO.BIH") file with the length of one Sector followed by maximum 63 Coded Text files ("KARINFO.cc") of variable length.

All files in the Karaoke Basic Information Area are encoded in successive Sectors starting at Sector 00:03:00, the files in this area are not interleaved. As a consequence the Basic Information Header file ("KARINFO.BIH") is located at Sector 00:03:00, the first Sector of the first "KARINFO.cc" file is located at Sector 00:03:01. The structure of the data in the Karaoke Basic Information Area is given in Figure II.3. The contents of the files in this area is described in chapter III.

Various character sets can be used for the KARINFO.cc files, such as ISO 646, ISO 8859-1 and JIS Kanji.

Figure II.3 Structure of the Karaoke Basic Information Area



### 2.3.3 Video CD Information Area

The Video CD Information Area contains the files "INFO.VCD" and "ENTRIES.VCD". As an option it may contain the files "LOT.VCD" and "PSD.VCD".

All files in the Video CD Information Area are encoded in successive Sectors starting at Sector 00:04:00, the files in this area are not interleaved.

The file "INFO.VCD" is the first file in the Video CD Information area and is located at Sector 00:04:00.

The file "ENTRIES.VCD" is located at Sector 00:04:01.

The optional file "LOT.VCD" is located from 00:04:02 to 00:04:33.

The optional file "PSD.VCD" has a start location 00:04:34 and a variable length up to a maximum of 256 sectors.

The contents of the files in the Video CD Information Area are described in chapter III and chapter V.

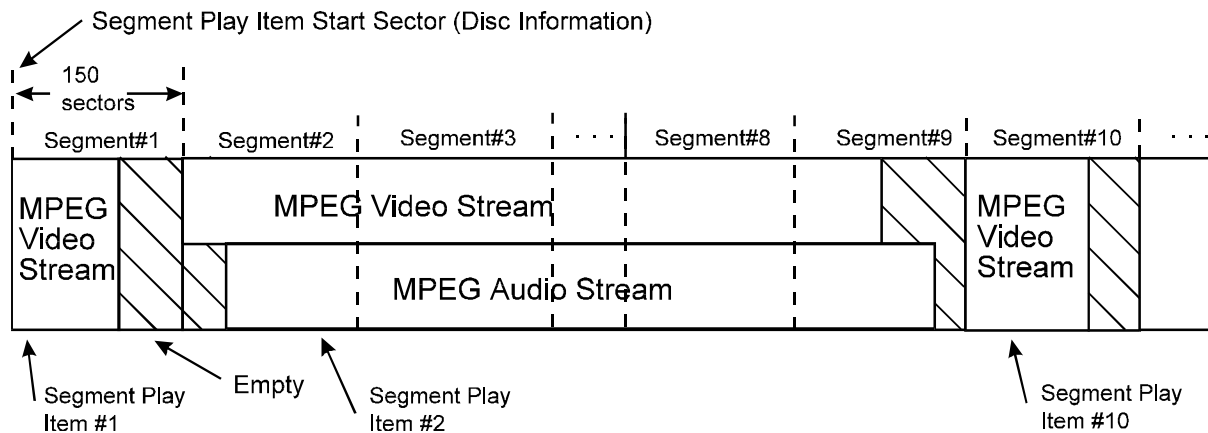
### 2.3.4 Segment Play Item Area

This is an optional area in track #1 that may contain a number of Segment Play Items. A Segment Play Item may consist of MPEG video, MPEG audio and MPEG encoded still pictures. Segment Play Items are not accessed directly by the normal track playing mechanism, but indirectly by interpretation of the Play Sequence Descriptor. The start of the Segment Play Item Area is indicated in the Segment Play Item Area field of "INFO.VCD". The coding of Segment Play Items is described in chapter IV.

The Segment Play Item Area is divided into contiguous segments of 150 sectors length and is addressed by segment number. The length of the Segment Play Item Area may be any integer number of segments ranging from 1 to a maximum of 1980. The segments are numbered consecutively starting from #1, which is the first segment.

Segment Play Items may occupy one or more segments, and the data must start at a segment boundary. The Segment Play Item data is padded with Empty Sectors to the end of a whole segment. A Segment Play Item is identified by its Segment Play Item number, which is equal to the number of its first segment. Only segment numbers that correspond to the first segments of Segment Play Items and are in the range 1..1980 are valid Segment Play Item Numbers. Figure II.4 gives an example of the Segment Play Items in the Segment Play Item Area.

Figure II.4 Example of Segment Play Items in the Segment Play Item Area



## 2.4 MPEG Audio/Video Tracks

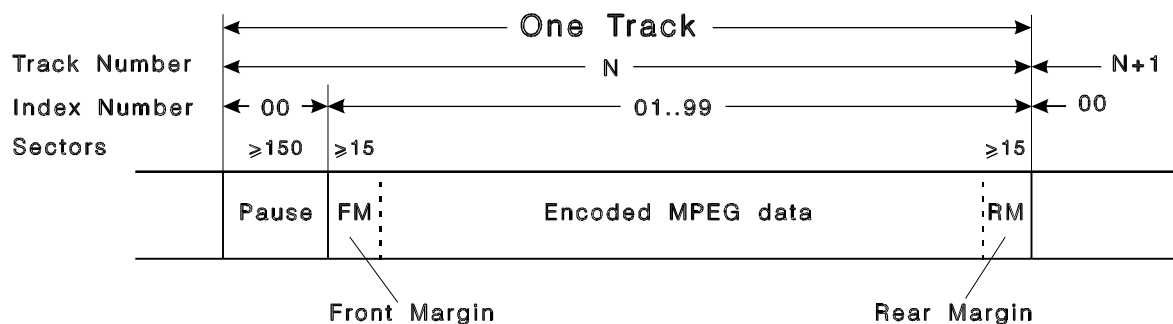
All MPEG Audio/Video Tracks (Track 2 and higher) on a VIDEO CD disc start with a Pause encoding of minimum 150 Empty Form 2 Sectors.

The Subheaders of all Sectors in the Pause of a Track are equal. Two methods for the encoding of the Subheader of the Sectors in the Pause of a Track are allowed. These methods are:

- A) - File Number equals to the Track Number minus one.
  - Channel Number equals \$00.
  - Submode byte equals %x11x000x.
  - Coding Information byte equals \$00.
- B) - File Number can have any value between 0 and 255.
  - Channel Number equals \$00.
  - Submode byte equals %xx1x000x.
  - Coding Information byte equals \$00.

The encoded Audio/Video data in a Track is preceded by a Front Margin and followed by a Rear Margin. The minimum length of both the Front Margin and the Rear Margin is 15 Sectors, the recommended length of the Front Margin is 30 Sectors and of the Rear Margin is 45 Sectors. Both the Front and the Rear Margin shall contain Empty Form 2 Sectors only. The Subheader of all Sectors in both Margins must be encoded according to method A. Figure II.5 gives the layout of an MPEG Audio/Video Track.

Figure II.5 Layout of an MPEG Audio/Video Track



## 2.5 CD-DA Tracks

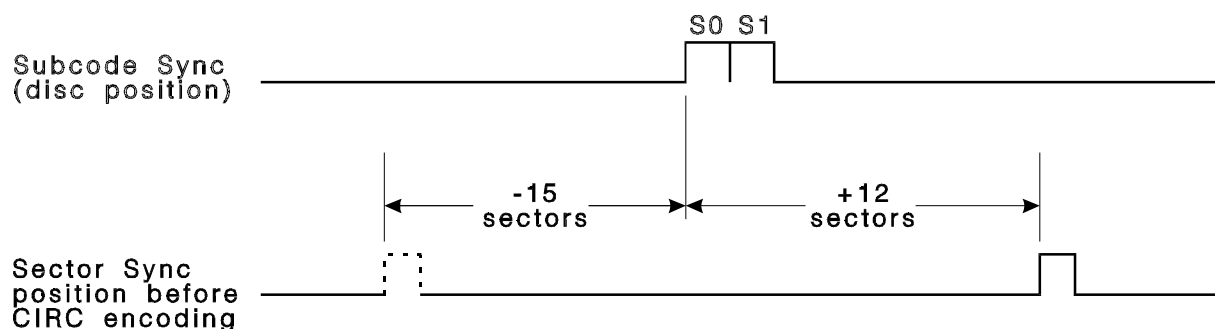
A VIDEO CD disc may as an option contain CD-DA Tracks. The CD-DA Tracks must be located after the MPEG Audio/Video Tracks. If a VIDEO CD disc contains CD-DA Tracks, then for the last MPEG Audio/Video Track the Rear Margin must be followed by a Post Gap of at least 150 Sectors. It is recommended that this Post Gap contains Silent Sectors. A Silent Sector is a Sector that contains data that is converted into audio silence after scrambling.

**II.3 Subcode Channels**

The Subcode Channels are encoded according to the CD-ROM specification.

For a correct detection of the MPEG Audio/Video data with a VIDEO CD player using Track search based on the Subcode P and Q channels, the maximum skew between the Subcode Sync and the Sector Sync is defined. The allowed skew between the start of the Subcode Sync S0 and the start of the Sector Sync with an identical address is  $\pm 12/-15$  Sectors, see Figure II.6.

Figure II.6 **Maximum skew between Subcode Sync and Sector Sync**



The reference point for the Subcode Sync position is the position of the Subcode Sync S0 on the disc. The reference point for the Sector Sync is the position of the first byte of the Sector Sync at the entrance of the CIRC encoder.

By using a CIRC decoder with a RAM buffer of 2 KBytes, a typical delay of 120 EFM frames (about 1.2 Sector) is caused by the CIRC/EFM encoding/decoding process. A typical delay of 1 Sector has to be added for the CD-ROM decoder. This gives the difference in delay between the Subcode Sync position and the Sector Sync position a typical value of about 2.2 Sectors. If the CIRC/EFM encoder causes a distinctly different (from this typical value) delay, the position of the Sector Sync and the Subcode Sync must be changed to compensate for this difference.



**Chapter III      Data Retrieval Structure****III.1      General**

This chapter describes the Data Retrieval Structure for VIDEO CD discs.

A VIDEO CD disc contains two different Data Retrieval Structures.

The first Data Retrieval Structure is the File System structure that conforms to the CD Bridge specification. This supports access to a VIDEO CD disc by CD-ROM XA, CD-I and other ISO 9660 compatible systems.

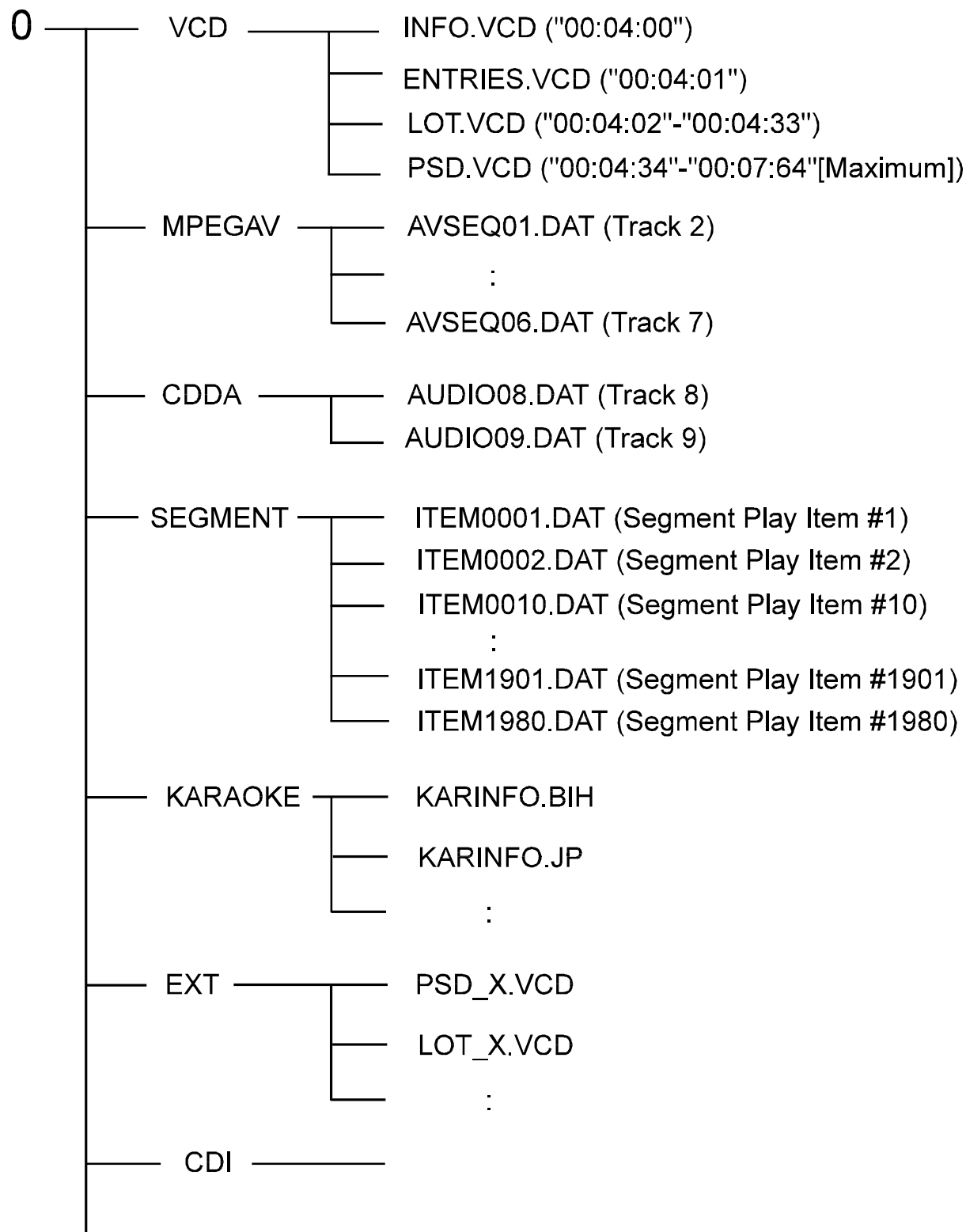
The second Data Retrieval Structure is based on the data contained in the Video CD Information Area and in the optional Karaoke Basic Information Area. Due to the fixed absolute location on the disc of these areas, a simple player can read this information. The data in these areas is mainly intended to describe the contents of the Tracks with Audio and Video data.

**III.2 Directory Structure**

The File System of a VIDEO CD disc conforms to the CD Bridge specification. The CD Bridge system utilizes the ISO 9660 file structure as specified for CD-ROM XA discs.

The required directories for a VIDEO CD disc are: Root directory 0, "CDI", "VCD" and "MPEGAV". If the Karaoke Basic Information Area (see chapter II.2.3.2) is available on a disc, then the files in this area must be located in the directory "KARAOKE". If the Segment Play Area is available on a disc then the files in this area must be located in the directory "SEGMENT". The Extended PSD files must be located in the directory "EXT". The files in the Video CD Information Area (see chapter II.2.3.3) must be located in the directory "VCD". All files that represent the MPEG Audio/Video Tracks must be located in the directory "MPEGAV". All files that represent CD-DA Audio Tracks must be located in the directory "CDDA". Other files or directories may exist outside the required VIDEO CD directory hierarchy. Figure III.1 gives an example of the file structure for a VIDEO CD disc. Additional files can exist within the directories shown. The version number of all files must be "1", in this document the version numbers are not shown.

Figure III.1 Example of the directory structure



**2.1 Root directory 0**

This is the Root directory of the disc. It may contain further directories or files in addition to those shown in Figure III.1.

**2.2 CDI directory**

This directory contains the CD-I specific files such as the required CD-I application program. The reserved name for this directory is "CDI".

The minimum required functionality of the CD-I application program is: Select and play an Audio/Video Sequence by using 'point and click' on the screen.

**2.3 MPEGAV directory**

This directory contains the files that represent the MPEG Audio/Video Tracks. Each MPEG Audio/Video Track on the disc is represented in this directory by a file with the name "MUSICnn.DAT" or "AVSEQnn.DAT". In one Album (see chapter III.2.5.1) only files with the name "MUSICnn.DAT" or files with the name "AVSEQnn.DAT" can be present. The reserved name for this directory is "MPEGAV".

**2.3.1 MUSICnn.DAT and AVSEQnn.DAT File**

Each file in the MPEGAV directory with the name "MUSICnn.DAT" or "AVSEQnn.DAT", in which nn is the Sequence Number, represents a Track with MPEG encoded Audio/Video data. The Sequence Number has the value of the Track Number minus one. In the file named "MUSICnn.DAT" or "AVSEQnn.DAT", the Sequence Number is encoded as a two digit decimal number with a leading zero. The file with the name "MUSIC01.DAT" or "AVSEQ01.DAT" corresponds to Sequence Number 1 and is the only file in Track number 2. The File Number encoded in the Subheader of each Sector of these files is equal to the Sequence Number of the file.

The Subheader of all MUSICnn.DAT and AVSEQnn.DAT Sectors is defined in Figure III.2

Figure III.2 **Subheader definition for the files MUSICnn.DAT and AVSEQnn.DAT**

Sector Type	File Number	Channel Number	Submode	Coding Information
MPEG Video	Sequence Number	\$01	%x11x001x	\$0F
MPEG Audio	Sequence Number	\$01	%x11x010x	\$7F

Note: Sequence Number = Track Number minus one

The Trigger bit is set to one in a sector where the player must execute the Auto Pause Function (see chapter VI.3, Auto Pause Wait Time).

**2.4 KARAOKE directory**

This optional directory contains the files from the Karaoke Basic Information Area (see chapter II.2.3.2). In the KARAOKE directory the required files are: "KARINFO.BIH" and minimal one of the files "KARINFO.cc" (in which cc represents the Country Code for this file, see chapter III.2.4.1.2). The reserved name for this directory is "KARAOKE".

**2.4.1 KARINFO.BIH File**

The file KARINFO.BIH has a fixed size of one Sector and is located at Sector 00:03:00. KARINFO.BIH is subdivided into 64 Packs of 32 bytes each, see Figure III.4. A detailed layout of the file KARINFO.BIH is given in Figure III.5. The first Pack contains an Identification String, the number of KARINFO.cc files and the number of Karaoke Sequences on the disc. The second and higher Packs describe the Coded Text files KARINFO.cc.

The Subheader of the file KARINFO.BIH Sector is defined in Figure III.3.

Figure III.3 **Subheader definition for the file KARINFO.BIH**

Field Name	Value
File Number	\$00
Channel Number	\$00
Submode	%10001001
Coding Information	\$00

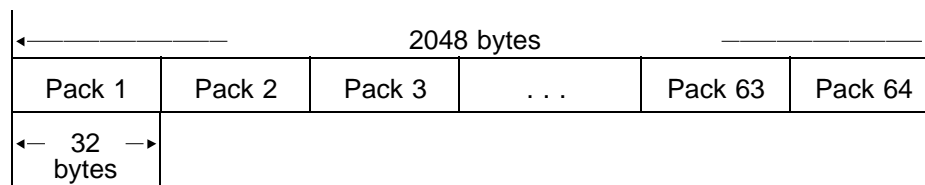
Figure III.4 **General layout of KARINFO.BIH**

Figure III.5 Detailed layout of KARINFO.BIH

Pack	Bytes	Contents
1	11 1 1 19	Identification String, "KARINFO.BIH". Number of Coded Text files (number of KARINFO.cc files). Number of Sequences on the disc. \$00, reserved.
2	1 2 2 1 1 8 17	Character Set Code. Country Code. \$00, reserved. File Offset. File Length. Disc and Sequence Information Flags. \$00, reserved.
3	1 2 2 1 1 8 17	Character Set Code. Country Code. \$00, reserved. File Offset. File Length. Disc and Sequence Information Flags. \$00, reserved.
4		
5		
.		
.		
64		

**2.4.1.1 Pack 1****Identification String**

This field indicates the start of the file KARINFO.BIH. The contents of this field is "KARINFO.BIH" encoded in the ISO 646 character set.

**Number of Coded Text files**

This one byte binary coded number indicates the number of KARINFO.cc files available. This value is equal to the number of active Packs following Pack 1.

**Number of Sequences on the disc**

This one byte binary coded number indicates the number of MPEG Audio/Video Tracks on the disc.

**2.4.1.2 Pack 2..64****Character Set Code**

This one byte binary coded number defines the character set used in the corresponding KARINFO.cc file. The character set codes used are:

\$00	Not used
\$01	ISO 646
\$02	ISO 8859-1
\$03	JIS Roman [14] & JIS Kanji 1990 [168], see Appendix I
\$04	Shifted JIS Kanji, including JIS Roman [14] & JIS Katakana [13]
\$05..\$FF	Reserved

Numbers in between square brackets [] are the ISO 2022 registration numbers.

It is possible that two or more Packs have the same Character Set Code.

**Country Code**

This string with a length of two characters contains the Country Code used for the corresponding KARINFO.cc file. The Country Codes is the ISO 3166 Alpha-2 code, it is encoded in capitals from the ISO 646 character set. Examples of valid Country Codes are:

JP	Japan
NL	Netherlands
SE	Sweden
US	USA

The Country Code is used to indicate the language used in the KARINFO.cc file. Each Pack is identified by a unique Country Code, one Country Code is only used for one Pack.

**File Offset**

This one byte binary coded number gives the location on the disc of the first Sector of the corresponding KARINFO.cc file as the number of Sectors offset from Sector 00:03:00, the minimum value of this offset is 1.

**File Length**

This one byte binary coded number gives the length of the corresponding KARINFO.cc file in Sectors.

**Disc and Sequence Information Flags**

These eight bytes define the Disc and Sequence Information Items that are available in the corresponding KARINFO.cc file. A one bit flag per Item is used. The least significant bit of the first byte corresponds to Item number 0, the most significant bit of the last byte corresponds to Item number 63. If a bit is set to 1, the corresponding Disc or Sequence Item must be available in the KARINFO.cc file. If a bit is set to 0, the corresponding Disc or Sequence Item is not available in the KARINFO.cc file.

Sequence Information Flags are valid for all Sequences on the disc, this means that the corresponding KARINFO.cc file must contain the same Items for each Sequence on the disc. If for one or more Sequences no text data is available for a Sequence Item, then this Sequence Item is coded with Item Length equals to zero.

**2.4.1.3 Unused Packs**

Unused Packs in the file KARINFO.BIH are filled with bytes with the value \$00.

**2.4.2 KARINFO.cc File**

Each KARINFO.cc file (Coded Text file) describes all MUSICnn.DAT or AVSEQnn.DAT files on the disc, the string cc represents the Country Code. The Country Code cc is a string with a fixed length of two characters. The Country Code cc is equal to the Country Code in the corresponding Pack of the file KARINFO.BIH (see chapter III.2.4.1.2).

Minimal one file KARINFO.cc must be available on the disc. All KARINFO.cc files are located on the disc in successive Sectors following Sector 00:03:00, so the first file starts at Sector 00:03:01. A KARINFO.cc file consists of an integer number of Sectors. The total size of all KARINFO.cc files shall be less than or equal to 128 KByte (maximum 64 sectors).

Figure III.6 **Subheader definition for the KARINFO.cc files**

Field Name	Value	Remark
File Number	\$00	
Channel Number	\$00	
Submode	%00001000 %10001001	Last Sector of a file only
Coding Information	\$00	



**2.4.2.1 Data Structure of the KARINFO.cc files**

Figure III.10 gives an overview of the structure of a KARINFO.cc file. Each KARINFO.cc file is divided into several Groups. Group 0 contains a description of the disc. The Groups 1..N describe the contents of the Sequences numbered 1..N (files MUSICnn.DAT or AVSEQnn.DAT with nn representing 1..N). The Groups are recorded onto the disc in sequential order with Group 0 recorded first. Each KARINFO.cc file is terminated with a Group having a Group Length that is equal to \$0000.

A **Group** consists of a two byte Group Length followed by one or more Item Packets. The Group Length defines the number of the remaining bytes in the Group (not including the Group Length).

The definition of the Group Length number is given in Figure III.7.

Figure III.7 **Group Length definition**

Group Length	Description
\$0000	End Of File mark. The last bytes of the file. The Remaining bytes in the Sector are set to \$00.
\$0001	Reserved. The minimum length of an Item Packet is 2 bytes.
\$0002 .. \$FFFE	Remaining number of bytes in the Group.
\$FFFF	Reserved.

An **Item Packet** consists of a one byte Item Number followed by a one byte Item Length followed by Text Data. The Item Length defines the number of Text Data bytes in the Item Packet. It is recommended that the Item Packets are ordered by Item Number.

The Definition of the **Item Number** is given in Figure III.8.

Figure III.8 **Item Number definition**

Item Number bits	Description
Bit b7	Set to 1 if this is the last Item Packet in a Group, else set to 0.
Bit b6	Reserved (= 0).
Bits b5..b0	Item Number.

The definition of the **Item Length** is given in Figure III.9.

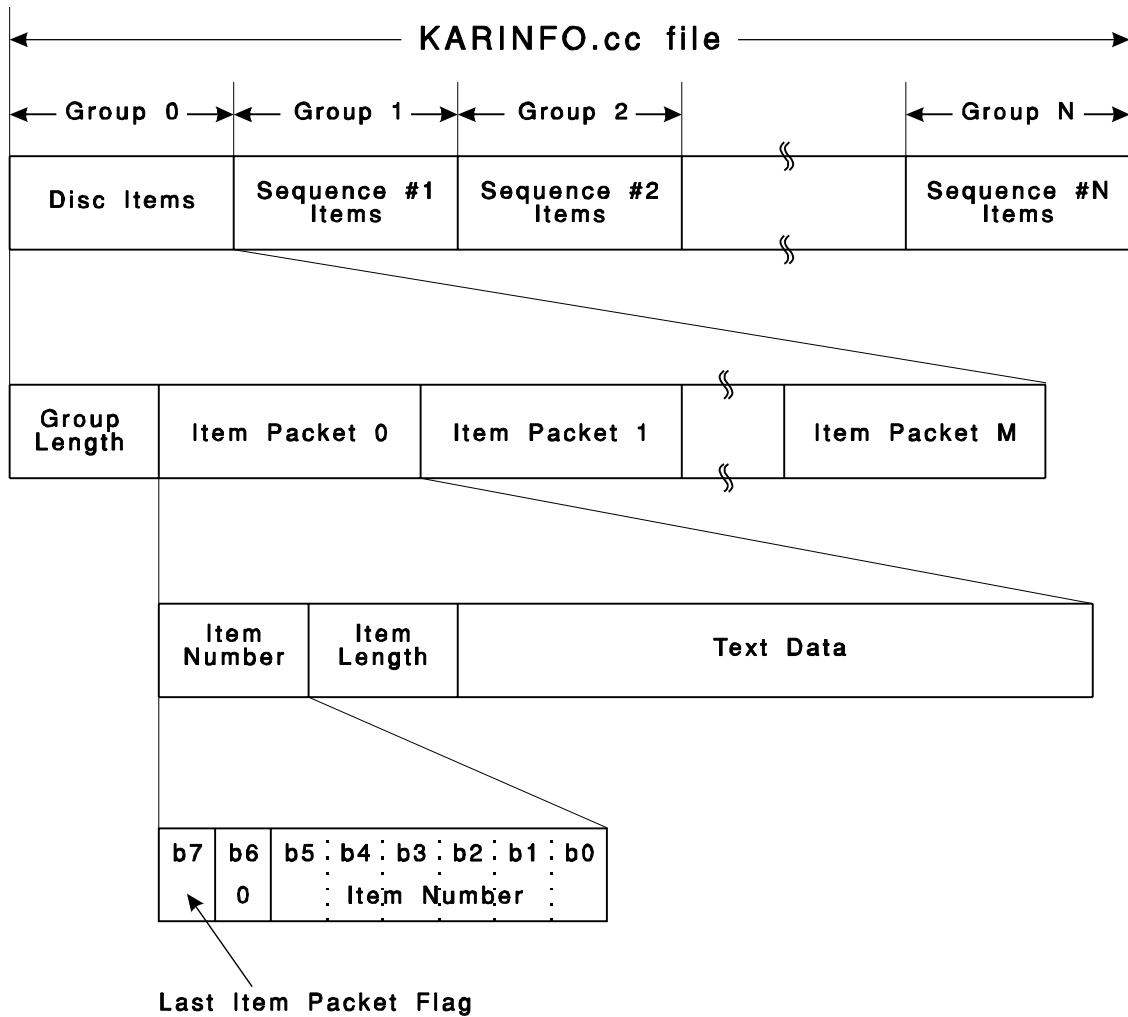
Figure III.9 **Item Length definition**

Item Length	Description
\$00	No Text Data in this Item Packet.
\$01 .. \$FE	Length in bytes of the Text Data in this Item Packet.
\$FF	Length in bytes of the Text Data in this Item Packet. The Text Data from next Item Packet is concatenated with the Text Data in this Item Packet. The Item Numbers in this and in next Item Packet are identical.

If Item Length equals to \$FF, the Item Packet contains 255 bytes of Coded Text. If exactly 255 bytes of Coded Text are encoded, the next Item Packet contains Item Length = 0.

The **Text Data** in an Item Packet is encoded according to the Character Set Code given in the corresponding Pack in the file KARINFO.BIH.

Figure III.10 Structure of a KARINFO.cc file



**2.4.2.2 Items for Group 0, the Disc Items**

The definition of the Disc Items is given in Figure III.11.

Figure III.11 **Disc Item Table**

Mandatory / Optional	Item Number	Contents	Remarks
Mandatory	0	Disc title.	
Mandatory	1	Disc catalog number.	ISO 646 coded.
Mandatory	2	Total number of Sequences on the disc.	ISO 646 coded.
Optional	3	Description of the disc contents.	
Optional	4..7	User definable Items.	
--	8..63	Not available.	Items 8..63 are Sequence Items

All Disc Items contain text encoded with the character set defined in the corresponding Pack of the file KARINFO.BIH unless otherwise noted.

**Disc title**

This Item contains the title of a disc as defined by the disc publisher.

**Disc catalog number**

This Item contains the catalog number of the disc as defined by the publisher. The disc catalog number is encoded with the ISO 646 character set.

**Total number of Sequences**

This Item contains the total number of MPEG Audio/Video Tracks on the disc. This number is encoded as a two digit decimal number with leading zero using the ISO 646 character set.

**Description of the disc contents**

This optional Item is used to explain the contents of the disc, like it is done on a disc jacket.

**User definable Items**

The definition of the contents of these Items is the responsibility of the disc publisher.

## 2.4.2.3 Items for the Groups 1..N, the Sequence Items

The definition of the Sequence Items is given in Figure III.12.

Figure III.12 Sequence Item Table

Mandatory / Optional	Item Number	Contents	Remarks
--	0..7	Not available	Items 0..7 are Disc Items
Mandatory	8	ISRC code of the Sequence	ISO 646 coded
Mandatory	9	Sequence title.	
Optional	10	Sequence title for sorting.	
Mandatory	11	Performers name.	
Optional	12	Performers name for sorting.	
Mandatory	13	Name of the song writer(s).	
Mandatory	14	Name of the composer(s).	
Optional	15	Name of the arranger(s).	
Optional	16	Name of the player(s).	
Optional	17	Header part of the song text.	
Optional	18	Song text.	
Optional	19	Karaoke key.	
Optional	20	Original key.	
Optional	21	Description of the contents of the Sequence.	
Optional	22..31	User definable Items.	
Optional	32..63	Reserved.	

All Sequence Items contain text encoded with the character set defined in the corresponding Pack of the file KARINFO.BIH unless otherwise noted.

**ISRC code of the Sequence**

This Item contains the International Standard Recording Code (see ISO 3901) associated with the Sequence. The twelve characters of the ISRC are encoded with figures and uppercase characters from the ISO 646 character set.

**Sequence title**

This Item contains the title of the Audio/Video Sequence.

**Sequence title for sorting**

This optional Item contains a sequence of characters that can be used for sorting the Sequence title.

**Karaoke key**

This optional Item contains the tonality of the audio part of the Sequence on the disc. Examples of Major keys are: "C", "C#", "D", "E", "F", "G", "A", "B" or "Ut", "Re", "Mi", ... Examples of Minor keys are: "Cm", "Fm", "Bbm", ... Flat keys can be represented by a "b", sharp keys by a "#". An example of a Sequence with more than one key is: "C# F Bb".

**Original key**

This optional Item contains the key of the original performance of this Sequence.

**User definable Items**

The definition of the contents of these Items is the responsibility of the disc publisher.

## 2.5 VCD directory

This directory contains the files from the Video CD Information Area (see chapter II.2.3.3). The required files in the VCD directory are "INFO.VCD" and "ENTRIES.VCD". Optional files in the VCD directory are "PSD.VCD" and "LOT.VCD".

The reserved name for this directory is "VCD".

The Subheader to be used with all files in the directory "VCD" is defined in Figure III.13.

Figure III.13 Subheader definition for the VCD directory

Field Name	Value
File Number	\$00
Channel Number	\$00
Submode	%x000100x
Coding Information	\$00

### 2.5.1 INFO.VCD File

The file INFO.VCD contains the VIDEO CD system identification and a provision to identify the discs from one Album. An Album is a series of discs which contain related Audio/Video programs. It also contains information associated with the optional Play Sequence Descriptor.

The file INFO.VCD has a fixed size of one sector and is located at Sector 00:04:00. A detailed layout of the file INFO.VCD is given in Figure III.14.

Figure III.14 Layout of INFO.VCD

Byte Position	Size (Bytes)	Field name	Contents
1 to 8	8	System Identification	"VIDEO_CD"
9 to 10	2	Specification Version Number	\$0200
11 to 26	16	Album Identification	ISO 646 characters
27 to 28	2	Number of Volumes in Album	numerical value
29 to 30	2	Album Set Sequence Number	numerical value
31 to 43	13	Size Map of Track Motion Pictures	Bit Map
44	1	Status Flags	Status byte
45 to 48	4	PSD Size	numerical value
49 to 51	3	<i>First Segment Address</i>	BCD sector location
52	1	<i>Offset Multiplier</i>	8
53 to 54	2	<i>Maximum List ID</i>	numerical value
55 to 56	2	<i>Maximum Segment Number</i>	numerical value
57 to 2036	1980	<i>Segment Play Item Contents Table</i>	Segment Play Item Contents bytes
2037 to 2048	12	Reserved	\$00

Note: Contents of *Italic* items must be \$00 in the case of no PSD (PSD Size is 0).

### System Identification

This field contains "VIDEO\_CD" coded in ISO 646.

### Specification Version Number

This two byte field contains the version number of the VIDEO CD specification used for the disc. The first byte (Byte Position 9) contains the binary encoded Major Version Number, the second byte contains the binary encoded Minor Version Number. For discs according to this VIDEO CD Version 2.0 specification, the Major Version Number is \$02 and the Minor Version Number is \$00.

### Album Identification

This ISO 646 encoded string contains the Album Identification as defined by the publisher. For example the ISO 646 encoded UPC code, padded at the end with spaces, can be used.



**Number of Volumes in Album**

This two byte binary coded number specifies the total number of discs (Volumes) in an Album. An Album<sup>1</sup> is a set of discs.

**Album Set Sequence Number**

This two byte binary coded number specifies the ordinal number of the Volume in the Album.

**Size Map of Track Motion Pictures:**

This field contains the Picture Size Flag Map for Track 2 and higher. The one bit flag specifies the picture size for the corresponding track. The flag is set to zero if the picture size is NTSC (352 x 240) and one if the picture size is PAL (352 x 288). Non-existent tracks or CD-DA tracks have the flag set to zero.

Bit 0 of the first byte of this map contains the flag for Track #2. Bit 1 of the last byte on this map contains the flag for Track #99.

---

<sup>1</sup> For all discs in an Album the rules for the Track numbering are:

- The special VIDEO CD Data Track (first Track on the disc) has a Track Number equal to one (see chapter II.2.3).
- The first MPEG Audio/Video Track on the disc has a Track Number equal to two (see chapter II.2.4).

**Status Flags:**

This byte contains status flags.

Figure III.15 **Status Flags**

Position	Flag	Contents
bit[0]	%0	File "KARINFO.BIH" is not present on the disc.
	%1	File "KARINFO.BIH" is present on the disc.
bit[1..2]	%00	Disc for unrestricted use.
	%01	Disc with Restriction Category 1.
	%10	Disc with Restriction Category 2.
	%11	Disc with Restriction Category 3.
bit[3]	%0	No Special Information is encoded in the MPEG picture.
	%1	Special Information is encoded in the MPEG picture (see chapter IV.2.1.1).
bit[4]	%0	MPEG User Data is not used for Closed Caption.
	%1	MPEG User Data is used for Closed Caption (see chapter VII.4).
bit[5]	%0	Start the next disc at List ID #1.
	%1	If the next disc has the same Album Identification as this disc, then start the next disc at List ID #2, else start at List ID #1.
bit[6]	%0	Start the next disc with Track 2.
	%1	If the next disc has the same Album Identification as this disc, then start the next disc with Track 3, else start with Track 2.
bit[7]	%0	Files "PSD_X.VCD" and "LOT_X.VCD" are not present on the disc.
	%1	Files "PSD_X.VCD" and "LOT_X.VCD" are present on the disc.

- Notes:
- Restriction Categories can be used to indicate guidance for viewing restrictions e.g. unsuitable for children under 12.
  - Bit[5] and bit[6] are intended to be used with multi disc Albums. For a single disc, these bits must be set to zero.

**PSD Size:**

This item contains the size in bytes of the Play Sequence Descriptor. It is set to zero if there is no PSD on the disc.

**First Segment Address:**

This item contains the location of the first sector of the Segment Play Item Area. It is coded in BCD in the form xx:xx:00. The last byte must be \$00. It is set to 00:00:00 if PSD size equals zero.

**Offset Multiplier:**

This one byte binary number contains the value of the Offset Multiplier. The list offsets used in the PSD are converted to byte offsets from the beginning of the PSD by multiplying by the Offset Multiplier. The Offset Multiplier is fixed at 8, but players should read the value of this item to obtain the value of the Offset Multiplier.

**Maximum List ID:**

This item contains the value of the maximum valid List ID number in the List ID Offset Table. It is set to zero if PSD size equals zero.

**Maximum Segment Number:**

This item contains the value of the maximum number of used Segments in the Segment Play Item Area. It is set to zero if PSD size equals zero.

**Segment Play Item Contents Table:**

This field contains the Segment Play Item Contents bytes for each Segment of the Segment Play Item Area from segment #1 to segment #1980. The Segment Play Item Contents byte is defined in Figure III.16. Unused Segments must have the Segment Play Item Contents byte set to zero. The field is set to all zeros if PSD size equals zero.

**Reserved**

These bytes are reserved for future use and must be set to \$00.

Figure III.16 Segment Play Item Contents byte

Position	Value	Description
bit[0..1]	%00	No MPEG audio data
	%01	Single_channel MPEG audio data
	%10	Stereo or Intensity_stereo MPEG audio data
	%11	Dual_channel MPEG audio data
bit[2..4]	%000	No MPEG video data
	%001	NTSC normal resolution size (352 x 240) still picture
	%010	NTSC normal and high resolution size (704 x 480) still picture
	%011	NTSC normal resolution size (352 x 240) motion picture
	%100	Reserved
	%101	PAL normal resolution size (352 x 288) still picture
	%110	PAL normal and high resolution size (704 x 576) still picture
	%111	PAL normal resolution size (352 x 288) motion picture
bit[5]	%0	First or only segment of a Play Item
	%1	Second or later segment of multi segment Play Item
bit[6..7]	%00	Reserved

In the case of a multi segment Play Item all Segment Play Item Contents bytes must be the same, with the exception of bit 5.

**2.5.2 ENTRIES.VCD File**

The file ENTRIES.VCD contains the list of start positions (List of Entries) in the MPEG Audio/Video Tracks on the disc.

The file ENTRIES.VCD has a fixed size of one Sector and is located at Sector 00:04:01. A detailed layout of the file ENTRIES.VCD is given in Figure III.17.

Figure III.17 **Layout of ENTRIES.VCD**

Byte Position	Size (Bytes)	Field name	Contents
1 to 8	8	File Identification	"ENTRYVCD"
9 to 10	2	Specification Version Number	\$0200
11 to 12	2	Entries Used	numerical value
13 to 16	4	Entry 1	See Fig III.18
.	.	.	.
13+4*(N-1) to 16+4*(N-1)	4	Entry N	See Fig III.18
.	.	.	.
2009 to 2012	4	Entry 500	See Fig III.18
2013 to 2048	36	Reserved	\$00

**File Identification**

This field contains "ENTRYVCD" coded in ISO 646.

**Specification Version Number**

This two byte field contains the version number of the VIDEO CD specification used for the disc. The contents of this field is identical to the contents of the Specification Version Number field in the file INFO.VCD.

**Entries Used**

This two byte binary encoded number contains the number of used Entries. The minimum value of the Entries Used field is 1, the maximum value is 500.

**Entry N**

The layout of an Entry is given in Figure III.18. The first Entry is Entry number 1 and is located at Byte Position 13. The fields of unused Entries are filled with \$00. Unused Entries are only allowed after the last used Entry. The Entries must be encoded in the order of increasing Entry Addresses. The List Of Entries must contain all start positions (as encoded in the Table Of Contents) of the MPEG Audio/Video Tracks, and can contain maximum 98 Additional Entries per Track.

Figure III.18 Layout of the Entry field in ENTRIES.VCD

Byte Position	Size (Bytes)	Field name	Contents
M	1	Track Number	numerical value
M+1	3	Entry Address	mm:ss:ff Sector address

**Track Number**

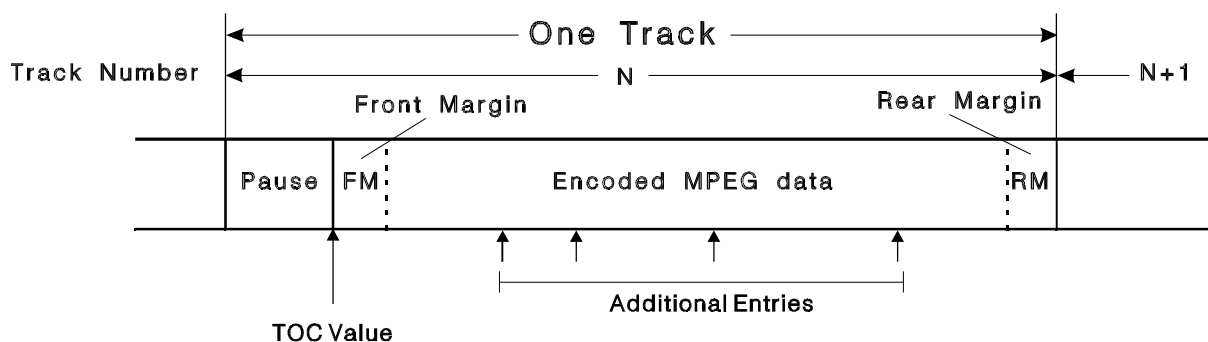
This two digit BCD number contains the Track Number of the Track in which the Entry Address is located.

**Entry Address**

This three byte BCD encoded field contains the mm:ss:ff encoded Sector address of the Entry Point. The mm value is encoded at Byte Position M+1, the ss value is encoded at Byte Position M+2 and the ff value is encoded at Byte Position M+3.

Any Sector<sup>1</sup> at an Additional Entry must contain the first byte of a sequence\_header (see ISO 11172).

Figure III.19 Example of an MPEG Audio/Video Track with Additional Entries



<sup>1</sup> There can be a skew between the Sector address and the Subcode address, see chapter II.3 page II-5.

### 2.5.3 PSD.VCD File

The optional file PSD.VCD contains the data for the Play Sequence Descriptor (PSD) (see chapter V for a full description of the Play Sequence Descriptor).

This file must be present if the PSD Size in INFO.VCD is unequal to zero.

The PSD has a fixed start location in the Video CD information Area, starting at sector 00:04:34. The size of the PSD may be variable, up to a maximum of 256 sectors.

### 2.5.4 LOT.VCD File

The optional file LOT.VCD contains the List ID Offset Table (LOT).

This file must be present if the PSD Size in INFO.VCD is unequal to zero.

The LOT allows the user to start playing the PSD from Lists other than the default start List ID Number. The LOT associates List ID numbers with the corresponding List Offset values.

The LOT has a fixed start location in the Video CD information Area, starting at sector 00:04:33 and has a fixed length of 32 sectors. The LOT contains the offset value for every valid List ID Number, coded binary in two bytes.

The first two bytes of the LOT are reserved and provisionally set to zero. The value of List ID #1 Offset is \$0000 (start of PSD).

The maximum valid List ID Number is 32767.

List ID Numbers that are not used in the PSD are set to \$FFFF. In addition, any other List ID numbers that are not appropriate for the user to access directly may be set to \$FFFF.

List ID Numbers other than the first, which must be 1, may be assigned at random. It is recommended that they are assigned in ascending order.

Figure III.20 Example of the List ID Offset Table

Sector Address	Description	Value	Size (Bytes)
"00:04:02"	Reserved	\$0000	2
	List ID 1 Offset	\$0000	2
	List ID 2 Offset	\$xxxx	2
	:	:	
	List ID m Offset	\$FFFF (Rejected)	2
	List ID n Offset	\$xxxx	2 <-- Maximum List ID = n
	Unused List ID	\$FFFF	2
"00:04:33"	:	:	
	Unused List ID	\$FFFF	2

**2.6 EXT directory**

The files in this optional directory are intended for the use of CD-I and other computer based systems. The reserved name for this directory is "EXT".

The directory EXT can contain the files "PSD\_X.VCD", "LOT\_X.VCD", "SCANDATA.DAT" and "CAPTIONnn.DAT".

**2.6.1 PSD\_X.VCD File**

This file is functionally equivalent to the file "PSD.VCD" but contains Extended Selection Lists instead of Selection Lists. The Extended Selection List contains additional data for the use of selection systems that use screen pointing devices (see chapter V.5). The length of the file must not exceed 512 KByte.

**2.6.2 LOT\_X.VCD File**

This file is functionally equivalent to the file "LOT.VCD". It has a fixed length of 64 KByte. It is coded in the same way as the data in "LOT.VCD" but has offset values for indexing into the file "PSD\_X.VCD".

**2.6.3 SCANDATA.DAT File**

If on a Video CD disc user data with Scan Information data (see chapter VII.3) is encoded, then the file "SCANDATA.DAT" must be present in the EXT directory.

The file "SCANDATA.DAT" contains a list with the addresses of all Sectors that contain the start of an Intra picture.

The layout of the file SCANDATA.DAT is given in Figure III.21.

Figure III.21 **Layout of SCANDATA.DAT**

Byte Position	Size (Bytes)	Field name	Contents
1 to 8	8	File Identification	"SCAN_VCD"
9 to 10	2	Specification Version Number	\$0200
11 to 12	2	N	numerical value
13 to 15	3	Address 1	mm:ss:ff Sector address
.	.	.	.
13+3*(N-1) to 15+3*(N-1)	3	Address N	mm:ss:ff Sector address

**File Identification**

This field contains "SCAN\_VCD" coded in ISO 646.



**Specification Version Number**

This two byte field contains the version number of the VIDEO CD specification used for the disc. The contents of this field is identical to the contents of the Specification Version Number field in the file INFO.VCD.

**N**

This two byte binary encoded number contains the number of Addresses given in the file SCANDATA.DAT. The minimum value of N is 1.

**Address N**

The Addresses must be encoded in the order of increasing mm:ss:ff value. The List of Addresses must contain the addresses of all Sectors in which an Intra picture starts.

**2.6.4 CAPTnn.DAT File**

For each Track that contains user\_data with Closed Caption information (see chapter VII.4) a file CAPTnn.DAT must be present in the EXT directory. The value of nn is the MPEG Audio/Video Sequence Number (Track Number - 1), encoded as a 2 digit decimal number with leading zero.

The layout of the file CAPTnn.DAT is given in Figure III.22.

Figure III.22 **Layout of CAPTnn.DAT**

Byte Position	Size (Bytes)	Field name	Contents
1 to 8	8	File Identification	"CAPTION_"
9 to 10	2	Specification Version Number	\$0200
11 to 12	2	nn	Track Number - 1, ISO 646 encoded
	variable	C_Group 1	
	variable	C_Group N	

**File Identification**

This field contains "CAPTION\_" coded in ISO 646.

**Specification Version Number**

This two byte field contains the version number of the VIDEO CD specification used for the disc. The contents of this field is identical to the contents of the Specification Version Number field in the file INFO.VCD.

**nn**

This two byte field contains the ISO 646 encoded MPEG Audio/Video Sequence Number (Track Number minus one) of the Track for which this file contains Closed Caption data.

**C\_Group N**

Each C\_Group N contains a C\_Time, C\_Length and C\_Length Data Bytes. The Data Bytes must be encoded in groups of two bytes. The Data Bytes are intended to be sent to a Closed Caption decoder at the time represented by the C\_Time value. The layout of C\_Group N is given in Figure III.23.

Figure III.23 **Layout of C\_Group N**

Byte Position	Size (Bytes)	Field name	Contents
M	3	C_Time	Starting time
M + 3	1	C_Length	2*P
M + 4	2	Character Pair 1	
:		:	
M + 2 + 2*P	2	Character Pair P	

**C\_Time**

This 24 bit binary encoded number contains the time at which Character Pair 1 should be sent to a Closed Caption decoder. The C\_Time value zero corresponds with the first Sector in the Track (Table Of Contents value). Within a Track, at every 1/75 of a second, the value C\_Time is incremented by one.

**C\_Length**

This 1 byte binary encoded number contains the number of bytes used by Character Pair 1 .. P.

**Character Pair #N**

This field contains two bytes, the first byte corresponds with the first character of a "two-character pair" as described in EIA-608, the second byte corresponds with the second character of a "two-character pair" as described in EIA-608. Character Pair #N is intended to be sent to the Closed Caption decoder at the time according to the following formula:

$$C\_Time/75 + (N-1)/29.97 \text{ seconds}$$

## 2.7 SEGMENT directory

This directory is optional and contains the files that represent the Segment Play Items. Each Segment Play Item on the disc is represented in this directory by a file with the name "ITEMnnnn.DAT". The value of nnnn is the Segment Play Item Number (see chapter II.2.3.4), encoded as a 4 digit decimal number with leading zeros. The Subheader of the files "ITEMnnnn.DAT" is defined in chapter V. The reserved name for this directory is "SEGMENT".

### 2.7.1 Segment Play Items

Segment Play Items contain MPEG Audio/Video data streams which may contain the following data:

- one or more MPEG coded Still Pictures, with or without MPEG Audio
- MPEG Audio without pictures.
- MPEG Audio/Video motion pictures.

Segment Play Items are located in the Segment Play Item Area (see chapter II.2.3.4). The coding of the MPEG data within Segment Play Items is described in chapter V.

## 2.8 CDDA directory

The CDDA directory is present on the disc if there are CD-DA Tracks on the disc. Each CD-DA Track on the disc is represented in this directory by a file with the name "AUDIOnn.DAT". The value of nn is Track Number of the CD-DA Track, encoded as a 2 digit decimal number with leading zero. The reserved name for this directory is "CDDA".

**Chapter IV MPEG Audio/Video Track encoding****IV.1 General**

Motion pictures and their associated Audio are coded according to the Video and Audio part of the MPEG standard ISO 11172. The system part of the MPEG standard is applied to store the ISO 11172 streams. One pack of the ISO 11172 stream is stored in one MPEG Video or Audio Sector.

The coding and the storage into CD-ROM Sectors of each ISO 11172 stream conforms to Chapter IX of the CD-I Full Functional Specification.

## IV.2 Encoding formats

## 2.1 Video encoding

The encoded video data is stored in MPEG Video Sectors conforming to the system part of the MPEG standard and to Chapter IX of the CD-I Full Functional Specification. The layout of an MPEG Video Sector is defined in chapter IV.3.2.2 (page IV-7).

The Video part of the MPEG standard is used to encode the Video data stream with:

$$\begin{aligned} \text{Picture\_size/Picture\_rate} &= 352 \times 240 / 29.97 \text{ Hz} \\ &= 352 \times 240 / 23.976 \text{ Hz} \\ &= 352 \times 288 / 25 \text{ Hz} \\ \text{Bit\_rate} &= \text{Maximum } 1151929.1 \text{ bits/sec}^1 \end{aligned}$$

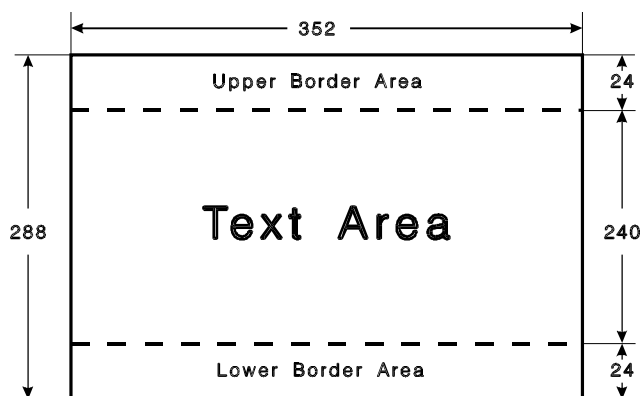
The recommended values for the pel\_aspect\_ratio (see ISO 11172) are:

- 1.0950 if the Picture\_size is 352 x 240
- 0.9157 if the Picture\_size is 352 x 288

To enable for instance fast forward and fast reverse play, it is recommended that at a maximum distance of 2 seconds<sup>2</sup> an intra\_coded picture and a sequence\_header (see ISO 11172) are encoded into the MPEG Video stream.

The location of the text, that is superimposed into the video of pictures encoded for the '352 x 288 / 25 Hz' format, is recommended to be in the Text Area of the screen (see Figure IV.1).

Figure IV.1 '352 x 288 / 25 Hz' picture format showing the Text Area



<sup>1</sup> This theoretical maximum value is calculated by using an Audio Packet\_data length of 2279 bytes, a Video Packet\_data length of 2296 bytes, the audio bit\_rate of 224000 bits/sec and 75 Packs/sec (Audio + Video).

<sup>2</sup> In case of encoding with Picture\_rates of 29.97 Hz or 23.976 Hz, a maximum distance of 2.003 seconds can be used.

**2.1.1 Special Information in the MPEG Video signal**

If bit[3] of the Status Flags field of the file INFO.VCD (see chapter III.2.5.1) is set to one, then the top pixel row of the MPEG picture can contain special information. In this case the top pixel row is intended to be displayed at line 21 of the video signal.

**2.1.2 User\_data in MPEG Video**

On a VIDEO CD disc, the MPEG picture layer can contain user\_data. The specification for this user\_data is given in chapter VII.

**2.2 Audio encoding**

The encoded audio data is stored in MPEG Audio Sectors conforming to the system part of the MPEG standard and to Chapter IX of the CD-I Full Functional Specification. The layout of an MPEG Audio Sector is defined in chapter IV.3.2.3 (page IV-8).

For stereo music programs the left audio channel is encoded as MPEG Audio Channel zero and the right audio channel as MPEG Audio Channel one. For Karaoke use the Dual\_channel mode only is used for special music programs, with in one channel the music without the vocal part and in the other channel the music with the vocal part; MPEG Audio channel one will in this case contain the music with the vocal part. For general use the Dual\_channel mode can be used for dual language programs, MPEG Audio channel zero will in this case contain the default language.

Figure IV.2 shows the application of the MPEG Audio channels. It is only allowed to change the audio Mode within one Sequence between Stereo and Intensity\_stereo.

Figure IV.2 **Audio channel encoding**

	Stereo program	Special Karaoke music program	Dual language program
CH-0	Left	Mono without vocal	Default language
CH-1	Right	Mono with vocal	Second language

The Audio part of the MPEG standard is used to encode the Audio data stream with:

Layer	=	II
Sampling_frequency	=	44.1 kHz
Emphasis	=	Off or 50/15 µsec
Bit_rate	=	224 kBit/s
Mode	=	Stereo, or Dual_channel, or Intensity_stereo

## IV.3 Sector layout

## 3.1 Sector Interleaving

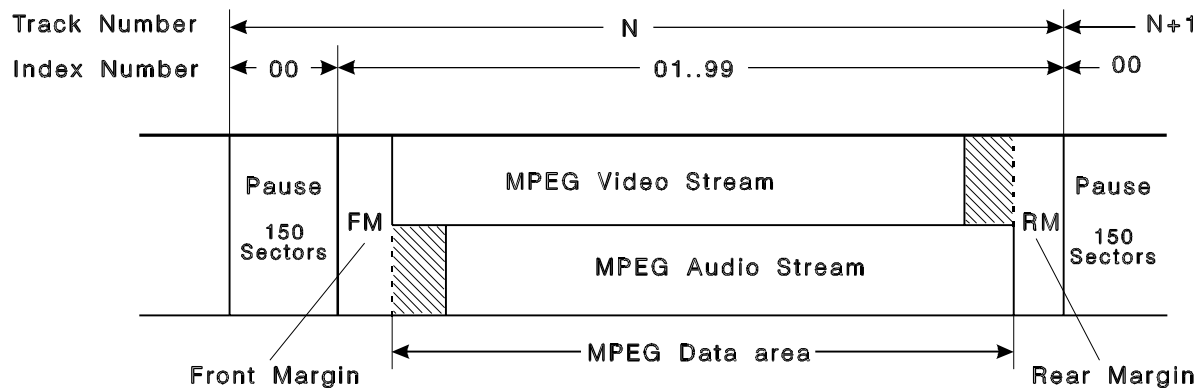
The MPEG Video and MPEG Audio Sectors must be interleaved in such a way that in the MPEG Video and Audio System Target Decoders (STD), as defined in the system part of the MPEG standard, neither underflow nor overflow can occur.

Figure IV.3 Example of MPEG Audio and Video interleaving



A shift in the recording of the MPEG Video and Audio data can be applied as long as no underflow or overflow occurs in the System Target Decoder buffers.

Figure IV.4 Example of the shift between Audio and Video data

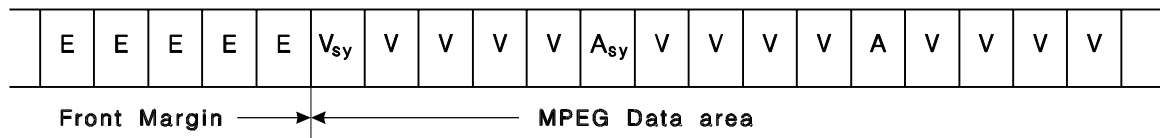


For the definition of the Front Margin and the Rear Margin see chapter II.2.4.

Both the first MPEG Video Sector and the first MPEG Audio Sector in the MPEG Data area contain an MPEG System\_header. The first Sector in the MPEG Data area is an MPEG Video or an MPEG Audio Sector containing the MPEG System\_header.



Figure IV.5 Example of the start of the MPEG Data area



E = Empty Form 2 Sector

V<sub>sy</sub> = MPEG Video Sector containing the MPEG System\_header

A<sub>sy</sub> = MPEG Audio Sector containing the MPEG System\_header

### 3.2 MPEG Sector format

One MPEG Sector contains one MPEG Pack and may also contain the ISO\_11172\_end\_code (see chapter IV.3.2.4). Each MPEG Pack can contain Audio\_packets or Video\_packets.

Figure IV.6 gives the general MPEG Video Sector format and Figure IV.7 gives the general MPEG Audio Sector format with the Pack\_header parameters. The Pack\_header parameters are given in Figure IV.8.

Figure IV.6 General MPEG Video Sector format

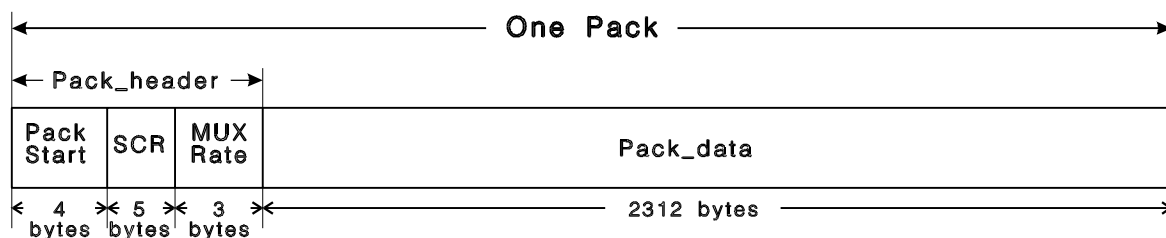
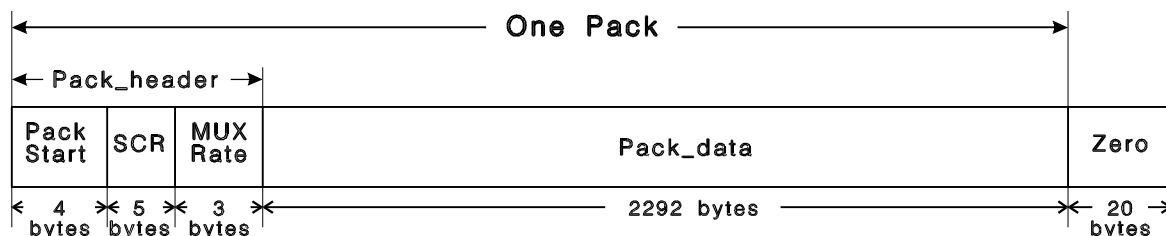


Figure IV.7 General MPEG Audio Sector format



The SCR coding is independent of the type of Packet (Audio or Video) stored in the Pack. The value of the SCR field is encoded according to the following formula:

$$\text{SCR}(i) = C + i * 1200$$

in which:  $i$  is the index number of the Sector in the Sequence; the first Sector of the Front Margin of a Sequence has index number zero.  
 $C$  is a constant; it is recommended to apply  $C$  equals to zero.  
 $1200$  is derived from the nominal 90 kHz system clock and the nominal 75 Hz Sector delivery rate.

Figure IV.8 Pack\_header fields

	MPEG field name	Value
Pack Start	pack_start_code	\$000001BA
SCR	system_clock_reference	$\text{SCR}(i) = C + i * 1200$
MUX Rate	mux_rate	3528 (2352 * 75 / 50)

### 3.2.1 MPEG Sectors containing a System\_header

An MPEG Video Sector containing a System\_header contains a Pack\_header, a System\_header and a Padding\_packet of 2297 bytes. Figure IV.9 shows the layout of an MPEG Video Sector containing a System\_header. An MPEG Audio Sector containing a System\_header contains a Padding\_packet of 2277 bytes and a zero field of 20 bytes. The System\_header parameters are given in Figure IV.10.

Figure IV.9 MPEG Video Sector containing the MPEG System\_header

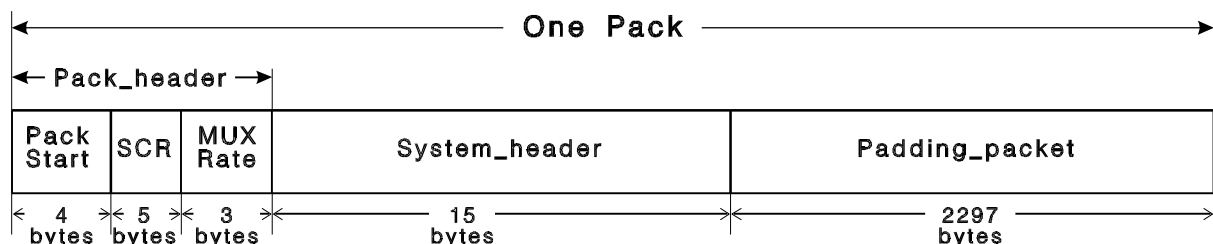
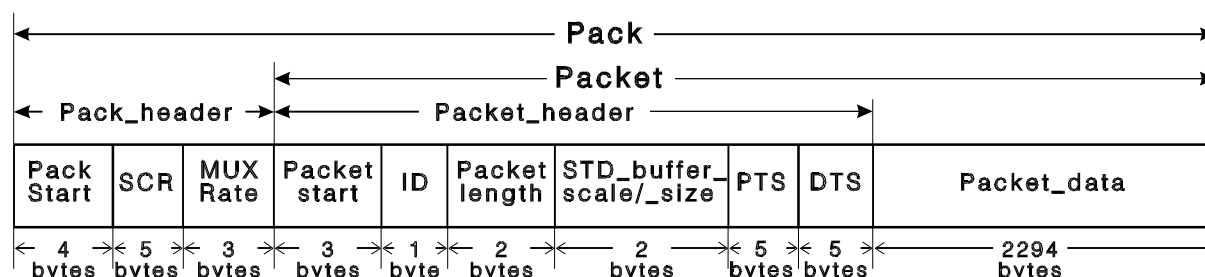


Figure IV.10 **System\_header fields**

MPEG field name	Value in A <sub>sy</sub> Sector	Value in V <sub>sy</sub> Sector
system_header_start_code	\$000001BB	\$000001BB
rate_bound	3528	3528
audio_bound	1	0
fixed_flag	%0	%0
CSPS_flag	%1	%1
system_audio_lock_flag	%1	%1
system_video_lock_flag	%1	%1
video_bound	0	1
stream_id	\$C0	\$E0
STD_buffer_bound_scale	%0	%1
STD_buffer_size_bound	32	46

### 3.2.2 MPEG Video Sector format

An MPEG Video Sector, except the first Video sector which contains the system\_header and the last Video sector which contains the ISO\_11172\_end\_code, contains one MPEG Video Pack with one MPEG Video\_packet. Both the Packet\_header and the Packet\_data must be contained in an even number of bytes. An example of an MPEG Video Sector is given in Figure IV.11. The Packet\_header parameters for an MPEG Video\_packet are given in Figure IV.12.

Figure IV.11 **Example of the format of an MPEG Video Pack**

The first Packet of each Sequence contains maximum 2294 bytes of Packet\_data. If the PTS and/or the DTS or the STD\_buffer\_scale/\_size is not present, to get the correct Packet length, stuffing bytes can be inserted or the Packet\_data field can be extended.

Figure IV.12 Video Packet\_header fields

	MPEG field name	Value
Packet Start	packet_start_code_prefix	\$000001
ID	stream_id	%11100000
Packet length	packet_length	
STD_buffer_scale/_size	STD_buffer_scale	1
STD_buffer_scale/_size	STD_buffer_size	46
PTS	presentation_time_stamp	
DTS	decoding_time_stamp	

### 3.2.3 MPEG Audio Sector format

An MPEG Audio Sector, except the first Audio sector which contains the system\_header and the last Audio sector which contains the ISO\_11172\_end\_code, contains one MPEG Audio Pack with one MPEG Audio\_packet. An MPEG Audio Pack is followed by a 20 bytes Zero field, all bytes in the Zero field have the value \$00. In all MPEG Audio Sectors that do not contain the ISO\_11172\_end\_code, the Packet\_data field shall be contained in 2279 bytes. If the STD\_buffer\_scale/\_size and/or the PTS are not encoded in an MPEG Audio\_packet, then stuffing\_bytes (see ISO 11172) shall be added until the length of the Packet\_header is 13 bytes. An example of an MPEG Audio Sector is given in Figure IV.13. The Packet\_header parameters for an MPEG Audio\_packet are given in Figure IV.14.

Figure IV.13 Example of the format of an MPEG Audio Pack

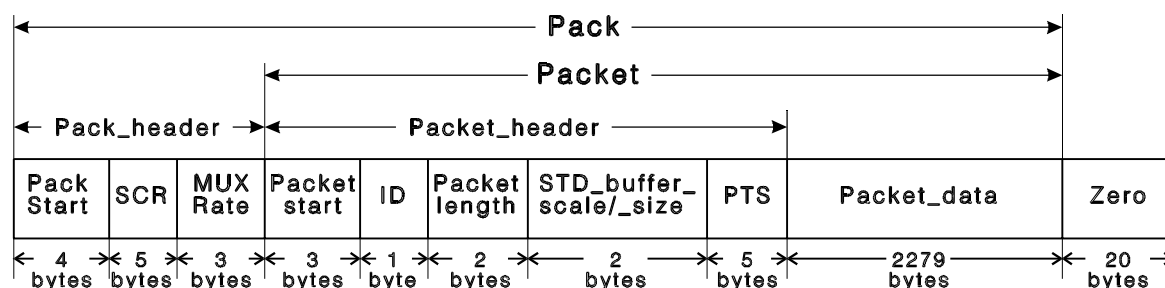


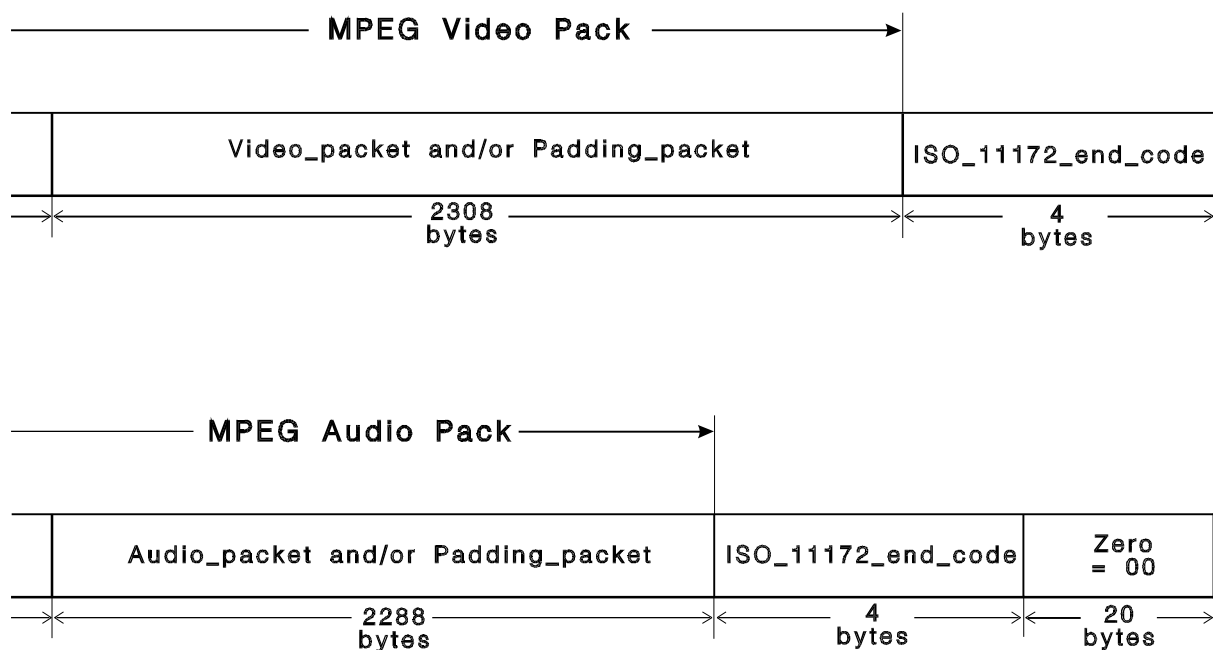
Figure IV.14 Audio Packet\_header fields

	MPEG field name	Value
Packet Start	packet_start_code_prefix	\$000001
ID	stream_id	%11000000
Packet length	packet_length	
STD_buffer_ scale/_size	STD_buffer_scale	0
STD_buffer_ scale/_size	STD_buffer_size	32
PTS	presentation_time_stamp	

### 3.2.4 MPEG Sector containing the ISO\_11172\_end\_code

In the final MPEG Video Sector and MPEG Audio Sector of each Sequence the ISO\_11172\_end\_code (= \$000001B9) is recorded. A Sector containing the ISO\_11172\_end\_code is allowed to contain one MPEG Audio\_ or Video\_packet and/or one Padding\_packet. All Audio\_, Video\_ or Padding\_packets must consist of an even number of bytes (Packet\_header and Packet\_data). In the MPEG Audio Sector containing the ISO\_11172\_end\_code, it is allowed that the Packet\_header has a length that is not equal to 13 bytes.

Figure IV.15 Format of the ISO\_11172\_end\_code



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**Chapter V      Segment Play Item Encoding****V.1      General**

Segment Play Items are encoded as either MPEG Video Sectors or MPEG Audio Sectors and are restricted to the Segment Play Item Area in Track #1. Unless stated otherwise the encoding of these sectors conforms to the specification in chapter II.2.3.4 and chapter IV. Segment Play Items allow additional audio bit rates and a Still Picture mode.

Segment Play Items are not preceded by a Front Margin or followed by a Rear Margin but they must start at the beginning of a Segment and be padded with Empty Sectors to occupy the whole of the final Segment.

Segment Play Items can not contain CD-DA encoded data. Each segments must contain MPEG Audio and/or MPEG Video data.

**V.2 Segment Play Video**

Segment Play Items may contain MPEG motion pictures encoded as in chapter IV. The maximum bit rate of the Video data stream is limited by the maximum bit rate available on Track 1 (1377600 bit/s) and the requirements of the Audio data stream. The Audio bit rate on Track 1 ranges from zero to 384 kbit/s.

Segment Play Items may contain one or more Still Pictures encoded as MPEG Video data sectors (see Chapter V.3).

Figure V.1 gives the Subheader definitions for MPEG Video Sectors in the Segment Play Items.

Figure V.1 **Subheader definition for Video Data in Segment Play Items**

Sector Type	File Number	Channel Number	Submode	Coding Information
Motion pictures	\$01	\$01	%x11x001x	\$0F
Normal resolution Still	\$01	\$02	%x11x001x	\$1F
High resolution Still	\$01	\$03	%x11x001x	\$3F
Padding	\$01	\$00	%x11x001x	\$1F

The Trigger bit is set to one in a sector where the player must execute the Auto Pause Function.

Sectors containing the sequence\_end\_code of a Still Picture have the EOR bit set to one.

The Subheader of the sector that contains a system\_header for Still Pictures is equal to the Subheader for Normal resolution Still Pictures.

An overview of some MPEG parameters for Video Data in the Segment Play Items is given in Figure V.2.

Figure V.2 **Overview of some MPEG parameters for Video Data in Segment Play Items**

Sector Type	Stream ID	CSPS Flag
Motion pictures	\$E0	%1
Normal resolution Still	\$E1	%0
High resolution Still	\$E2	%0
Padding	\$BE	-



**V.3 Still Picture Data Format**

Still Pictures are located only in the Segment Play Item Area. All Still Pictures are encoded in Normal Resolution (352 x 240 [NTSC size] or 352 x 288 [PAL size]). As an option, Still Pictures can be encoded in both Normal and High resolution (704 x 480 [NTSC size] or 704 x 576 [PAL size]).

High Resolution Still Pictures must be interleaved with Normal Resolution pictures with the same picture content.

The Sector interleaving method for the audio bit stream and the video bit stream containing the Still Pictures is the same as for Motion Pictures (see chapter IV.3).

**3.1 Video sequence parameters for Normal Resolution Still Pictures**

Each video sequence for the Normal Resolution (352 x 240 [NTSC] or 352 x 288 [PAL]) Still Picture consists of a sequence\_header, one Intra picture (1 GOP), and a sequence\_end\_code. The maximum VBV buffer size and the maximum size of an encoded Normal Resolution Still Picture is 46 KByte. The VBV buffer size is equal to the size of the encoded Still Picture rounded up to a multiple of 2048 bytes.

Structure of the video sequence:

1 sequence = sequence\_header + 1 GOP (1 Intra picture) + sequence\_end\_code

Figure V.3 shows the sequence\_header fields for Normal Resolution Still Pictures. Figure V.4 shows the picture\_header fields for Normal Resolution Still Pictures.

Figure V.3 **Sequence\_header fields for Normal Resolution Still Pictures**

MPEG field name	NTSC	PAL
sequence_header_code	\$000001B3	\$000001B3
horizontal_size	352	352
vertical_size	240	288
pel_aspect_ratio	(CCIR601 525 lines)	(CCIR601 625 lines)
picture_rate	(29.97 Hz)	(25 Hz)
vbv_buffer_size		
constrained_parameter_flag	%0	%0
bit_rate	\$3FFFF	\$3FFFF

Figure V.4 **Picture\_header fields for Normal Resolution Still Pictures**

MPEG field name	NTSC/PAL
picture_start_code	\$00000100
temporal_reference	%0000000000
picture_coding_type	%001 (Intra-Picture)
vbv_delay	\$FFFF

**3.2 Video sequence parameters for High Resolution Still Pictures**

Each video sequence for the High Resolution (704 x 480 [NTSC] or 704 x 576 [PAL]) Still Picture consists of a sequence\_header, one Intra picture (1 GOP), and a sequence\_end\_code. The maximum VBV buffer size and the maximum size of an encoded High Resolution Still Picture is 224 KByte. The VBV buffer size is equal to the size of the encoded Still Picture rounded up to a multiple of 2048 Byte.

Structure of the video sequence:

1 sequence = sequence\_header + 1 GOP (1 Intra picture) + sequence\_end\_code

Figure V.5 shows the sequence\_header fields for High Resolution Still Pictures. Figure V.6 shows the picture\_header fields for High Resolution Still Pictures.

Figure V.5 **Sequence\_header fields for High Resolution Still Pictures**

MPEG field name	NTSC	PAL
sequence_header_code	\$000001B3	\$000001B3
horizontal_size	704	704
vertical_size	480	576
pel_aspect_ratio	(CCIR601 525 lines)	(CCIR601 625 lines)
picture_rate	(29.97 Hz)	(25 Hz)
vbv_buffer_size		
constrained_parameter_flag	%0	%0
bit_rate	\$3FFFF	\$3FFFF

Figure V.6 **Picture\_header fields for High Resolution Still Pictures**

MPEG field name	NTSC/PAL
picture_start_code	\$00000100
temporal_reference	%0000000000
picture_coding_type	%001 (Intra-Picture)
vbv_delay	\$FFFF

### 3.3 Video stream parameters for Still Pictures

The pack and packet structure for Still Pictures are the same as those specified for Motion Pictures. There are two types of video stream for Still Pictures. One is the Normal Resolution Still Picture stream and the other is the Mixed Resolution Still Picture stream. A Normal Resolution Still Picture stream consists of a system\_header, one or more Normal Resolution Still Pictures, and ISO\_11172\_end\_code. A Mixed Resolution Still Pictures stream consists of a system\_header, one or more Mixed Resolution Still Pictures (see chapter V.3.4), and ISO\_11172\_end\_code.

It is possible to arrange padding packets between Still Pictures in order to show these pictures at a suitable interval.

A video stream consists of at least one system\_header, a Still Picture and the ISO\_11172\_end\_code.

Structure of the video stream for Normal Resolution still pictures:

1 stream = system\_header + 1 sequence + (padding) + (system\_header) + 1 sequence +  
...+ (padding) + (system\_header) + 1 sequence + ISO\_11172\_end\_code

Structure of the video stream for Mixed Resolution still pictures:

1 stream = system\_header + 1 Mixed Sequence + (padding) + (system\_header) +  
1 Mixed Sequence +...+ (padding) + (system\_header) + 1 Mixed Sequence  
+ ISO\_11172\_end\_code

An example of a Normal Resolution Still Picture stream is given in Figure V.7.

The pack\_header fields are given in Figure V.8. The system\_header fields are given in Figure V.9. The packet\_header fields are given in Figure V.10.

Figure V.7 Example of Normal Resolution Still Picture stream

<b>system_header</b>	<b>1 sequence</b>	<b>padding</b>	<b>1 sequence</b>	<b>padding</b>	<b>...</b>	<b>1 sequence</b>	<b>ISO_11172_end_code</b>
----------------------	-------------------	----------------	-------------------	----------------	------------	-------------------	---------------------------

Figure V.8 Video pack\_header fields

MPEG field name	Value
pack_start_code	\$000001BA
system_clock_reference	SCR(i) = i * 1200 + C
mux_rate	3528 (2352 * 75 / 50)

In Figure V.8, the definitions of i and C are:

- i is the index number of the Sector in the Sequence; the first Sector of a Segment Play Item has number zero.
- C is a constant; it is recommended to apply C equals zero.

Figure V.9 **System\_header fields**

MPEG field name	Value
system_header_start_code	\$000001BB
rate_bound	3528
audio_bound	0
fixed_flag	%0
CSPS_flag	%0
system_audio_lock_flag	%1
system_video_lock_flag	%1
video_bound	1 (Normal) or 2 (Mixed)
(Normal)	
stream_id	\$E1
STD_buffer_bound_sca	%1
le	46
STD_buffer_size_boun	
d	
(High)	
stream_id	\$E2
STD_buffer_bound_sca	%1
le	Integer part of ((encoded picture size + 1023) / 1024)
STD_buffer_size_boun	
d	

Figure V.10 Packet\_header fields

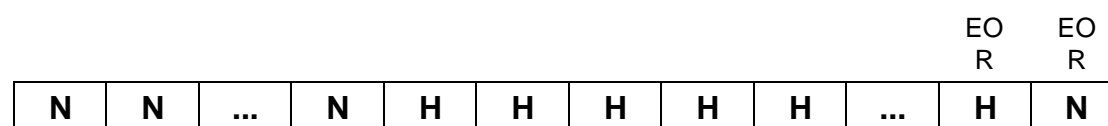
MPEG field name	Value
packet_start_code_prefix	\$000001
(Normal)	
stream_id	\$E1
packet_length	-----
STD_buffer_scale	1
STD_buffer_size	46
(High)	
stream_id	\$E2
packet_length	-----
STD_buffer_scale	1
STD_buffer_size	Integer part of $((\text{encoded size} + 1023) / 1024)$
(Normal/High)	
presentation_time_stamp	-----
mp	PTS - (picture duration)
decoding_time_stamp	
(Padding)	
stream_id	\$BE
packet_length	-----

### 3.4 Sector allocation for Mixed Sequence

A Mixed Sequence is a sector interleaved Video sequence that contains both Normal and High Resolution Still Pictures.

At the last Sector of each picture the EOR (End Of Record) bit in the Subheader field must be set to one. The recommended sector allocation for Mixed Sequences is given in figure V.11.

Figure V.11 Recommended sector allocation for a Mixed Sequence



**N:** Sector of a Normal Resolution Still Picture sequence

**H:** Sector of a High Resolution Still Picture sequence

**V.4 Segment Play Audio**

Segment Play Audio Sectors are MPEG Audio Sectors encoded as defined in chapter IV.2.2, with the following exceptions.

The Audio bit rates that can be used in Segment Play Audio Sectors are:

- Stereo, Intensity\_stereo, Dual\_channel mode:  
128 kbit/s, 192 kbit/s, 224 kbit/s, 384 kbit/s.
- Single\_channel mode:  
64 kbit/s, 96 kbit/s, 192 kbit/s.

The File Number field of the subheader byte is set to \$01.

The Trigger bit is set to one in a sector where the player must execute the Auto Pause Function.

The Audio pack\_header fields are given in Figure V.12.

Figure V.12 **Audio pack\_header fields**

MPEG field name	Value
pack_start_code	\$000001BA
system_clock_reference	$SCR(i) = i * 1200 + C$
mux_rate	3528 (2352 * 75 / 50)

In Figure V.12, the definitions of i and C are:

- i is the index number of the Sector in the Sequence; the first Sector of a Segment Play Item has number zero.
- C is a constant; it is recommended to apply C equals zero.

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**Chapter VI Play Sequence Descriptor (PSD)****VI.1 General**

This chapter describes the Play Sequence Descriptor (PSD). This is a set of control structures that enables the playback of preprogrammed sequences with user selection and interaction.

Unless otherwise stated, the term PSD refers in this chapter to the contents of both PSD.VCD and PSD\_X.VCD.

There are two basic control structures i.e. the Play List and Selection List. The Play List defines a list of Play Items that are played in sequence. The Selection list defines the action of the player in response to various user inputs, and may be used to implement menu systems for user selection of sequences. An End List is used to terminate the PSD interpretation.

The actions of the player in response to user actions (NEXT, PREVIOUS, DEFAULT SELECTION, NUMERIC, RETURN) are described in Appendix A III.

A Play Item may be one of the following items:

- The whole or part of an MPEG Audio/Video Track.
- A complete CD-DA Audio Track.
- One, or more, MPEG encoded Still Pictures with optional MPEG Audio.
- MPEG Audio with no pictures.

The PSD resides on disc in two functionally equivalent forms. One form is intended for use by dedicated microprocessors in players, and has a fixed location in the Video CD Information Area. The other form is intended for use by CD-I and other computer systems, and is contained in the file PSD\_X.VCD. It contains the same functional information as PSD.VCD in the Video CD Information Area, but the Lists are extended to include hotspot information.

The default starting point for interpretation of the PSD is at list ID Number \$0001, which is located at the beginning of the PSD (offset \$0000). A mechanism exists for the user to start at alternative List ID Numbers. The information for indexing into the PSD is contained in the List ID Offset Table (LOT, see chapter III.2.5.4). Computer systems that interpret the PSD\_X.VCD file may use the functionally equivalent LOT\_X.VCD file for the same purpose.

Each Play Item is located either in Tracks (2 or higher) or in the Segment Play Item Area on Track 1 (see figure II.1).

If a Play Item includes one or more pictures, the last picture is displayed until it is replaced by the next picture.

**VI.2 PSD constraints**

References to PSD List Addresses are expressed in Offset Units. The size of the Offset Unit is defined in the Offset Multiplier field of the Disc Information data. The offset in bytes from the beginning of the file is equal to offset value multiplied by the Offset Multiplier.

The start of all Lists must be aligned on Offset Unit boundaries.

Lists in PSD.VCD can not cross Sector boundaries. For Lists in PSD\_X.VCD it is allowed to cross Sector boundaries.

Unused areas in the PSD must be padded with zero bytes.

List ID Number \$0001 is located at the beginning of the PSD (offset \$0000).

**VI.3 Play List**

The Play List defines a list of Play Items that are to be played sequentially. The definition of the Play List structure is given in Figure VI.1.

Figure VI.1 **Play List structure**

Field Name	Size (Bytes)
Play List Header	1
Number Of Items (NOI)	1
List ID	2
Previous List Offset	2
Next List Offset	2
Return List Offset	2
Playing Time	2
Play Item Wait Time	1
Auto Pause Wait Time	1
Play Item#1 Number	2
:	:
Play Item#(NOI) Number	2

**Play List Header:**

This one byte code identifies the beginning of the Play List and equals \$10.

**Number Of Items (NOI):**

This one byte binary coded number gives the number of Play Items in this Play List. The minimum value of NOI is one.

**List ID:**

The layout of the List ID field is described in Figure VI.2.

Figure VI.2      **Layout of the List ID field**

Bit position	Value	Description
bit[15]	%0	This List is not rejected in the LOT
	%1	This List is rejected in the LOT
bit[14..0]	0	Reserved
	1..\$7FFF	List ID Number

The List ID Number must be unique among all the Lists on the disc.

The List ID Number of the List that is located at the beginning of the PSD (offset \$0000) must be \$0001. It is recommended that the List ID Numbers are assigned in ascending order.

**Previous List Offset:**

Previous List Offset is the offset of the list that is played on executing the "PREVIOUS" function, see Appendix A.III.

**Next List Offset:**

Next List Offset is the offset of the list that is played after playing this list or on executing the "NEXT" function, see Appendix A.III. A valid offset must be set in this offset. The value \$FFFF is not allowed.

**Return List Offset:**

Return List Offset is the offset of the list that is played when the "RETURN" function is executed, see Appendix A.III.

**Playing Time:**

Playing Time defines the number of sectors to play from each Play Item of this Play List, starting from the beginning of the item. The Playing Time can not exceed the maximum playing time of any Play Item. The Playing Time is zero for a Still Picture. The Start Position of Play Items from 2 to 599 is the start Sector as given in the TOC or in ENTRIES.VCD. The Start Position of Play Items from 1000 to 2979 is the first Sector of the Segment Play Item.

The layout of the Playing Time field is described in Figure VI.3.

Figure VI.3 Layout of the Playing Time field

Value	Description
0	Play until the end of the Item
1	Play 5 sectors
:	
n	Play 5 * n sectors
:	
\$FFFF	Play 5 * 65535 (= 327675) sectors ("72:49:00")

**Play Item Wait Time:**

Play Item Wait Time defines the wait time after playing each Play Item. The layout of the Play Item Wait Time field is described in Figure VI.4.

Figure VI.4 Layout of the Play Item Wait Time field

Value	Wait Time
0	no wait
1 - 60	1 - 60 sec
61	70 sec
62	80 sec
:	
n	(n - 60) x 10 + 60 sec
:	
\$FE(254)	2000 sec (33 min. 20 sec)
\$FF	infinite

All waits may be terminated by user interaction function.

**Auto Pause Wait Time:**

Auto Pause Wait Time is the wait time at Auto Pause. This wait time is used for each Play Item of this Play List. The Auto Pause function is executed on playing a sector which has the trigger bit set to one. When the Auto Pause function is executed, the player pauses the play until a manual interactions or until the Auto Pause Wait Time is exceeded.

See **Play Item Wait Time** for the definition of this value.

**Play Item #n Number (n = 1..NOI):**

This two-byte binary coded number contains the Play Item Number (PIN) to be played.

The definition of Play Item Number is given in Figure VI.5.

Figure VI.5 Definition of Play Item Number

Play Item Number (PIN)	Description
0 .. 1	Play nothing
2 .. 99	Play corresponding Track number
100 .. 599	Play from Entry in "ENTRIES.VCD" to the end of the Track. Entry Number = PIN - 99.
600 .. 999	Reserved
1000 .. 2979	Play Segment Play Item. Segment Play Item Number = PIN - 999.
2980 .. \$FFFF	Reserved

**VI.4 Selection List**

The Selection List is used in file PSD.VCD.

Selection List is a List for implementing selection menus and enabling branching under user control. For functionality see appendix A III. The definition of the Selection List structure is given in Figure VI.6.

Figure VI.6 **Selection List structure**

Field Name	Size (Bytes)
Selection List Header	1
Reserved	1
Number of Selections (NOS)	1
Base of Selection Number (BSN)	1
List ID	2
Previous List Offset	2
Next List Offset	2
Return List Offset	2
Default List Offset	2
Time-out List Offset	2
Wait Time for Time-out	1
Loop Count & Jump Timing	1
Play Item Number	2
Selection#BSN Offset	2
:	
Selection #(BSN+NOS-1) Offset	2

**Selection List Header:**

This one-byte code identifies the beginning of the Selection List and equals \$18.

**Reserved**

This one byte field is reserved and set to \$00.

**Number of Selections (NOS):**

This one-byte binary number gives the number of selections of this List. The maximum number of selections is 99 (from 0 to 99). If the Time-out List Offset is equal to \$FFFF, then the value of zero is not allowed for Number of Selections.

**Base of Selection Number (BSN):**

Base of Selection Number indicates the first selection number of this List. The range of Base of Selection Number is 1 to 99. The maximum value of Base of Selection Number plus Number of Selections is 100.

**List ID:**

See the description of List ID of Play List (see chapter VI.3).

**Previous List Offset:**

See the description of Previous List Offset of Play List (see chapter VI.3).

**Next List Offset:**

Next List Offset is the offset of the list that is played on executing the "NEXT" function (see chapter VI.3). If this equals \$FFFF, the "NEXT" function is disabled.

**Return List Offset:**

See the description of Return List Offset of Play List (see chapter VI.3).

**Default List Offset:**

Default List Offset is the offset of the list which is played on executing "Default Selection" function. If this equals \$FFFF, the "Default Selection" function is disabled.

If this equals \$FFFE or \$FFFD, the Selection Offset Table from #BSN to #(BSN + NOS - 1) is redefined as a Multi Default Selection Offset Table.

The Multi Default Selection function can be used on MPEG Audio/Video Tracks which have been divided into areas by means of entries in ENTRIES.VCD. If there are M entries in ENTRIES.VCD for the Track then NOS = M.

Within a Track, the Area #N is defined as the area between the Nth Entry and the (N+1)th Entry or between the Nth Entry and EOF in the case of the last area. When the "Default Selection" function is executed while playing Area #N, then Selection #N is executed (See Figure V.8). If the List Offset equals \$FFFD, then the Numeric function is disabled.

In a Selection List with a Multi Default Selection, the Base Selection Number is set to \$01 and the Jump Timing bit (see Figure VI.9) must be set to %0 (jump immediately).

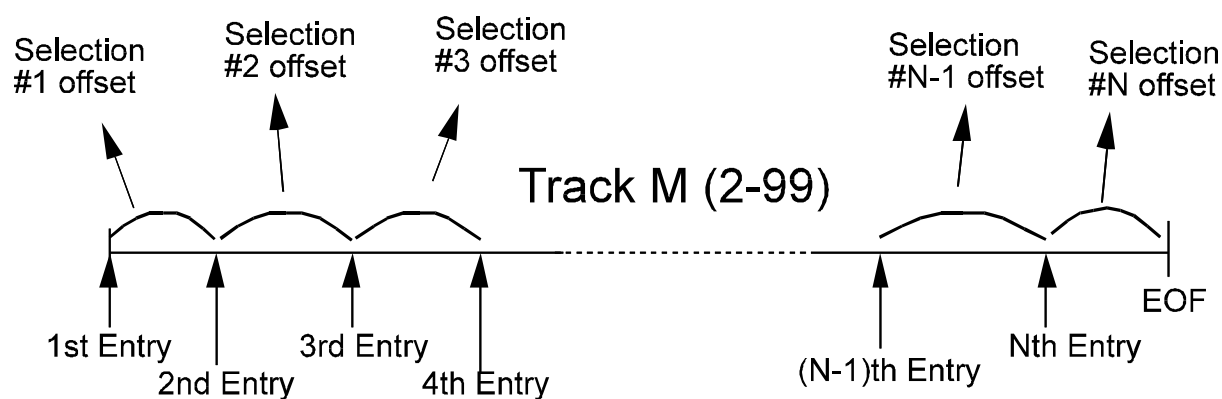
The parameters for Multi Default Selection are given in Figure VI.7. An example of Multi Default Selection is given in Figure VI.8.



Figure VI.7 Parameters of multi default selection

Field Name	Value
Selection List Header	\$18
Reserved	\$00
Number of Selections (NOS)	Number of entries in the Track (M)
Base of Selection Number (BSN)	\$01 (Fixed)
List ID	
Previous List Offset	
Next List Offset	
Return List Offset	
Default List Offset	\$FFFE or \$FFFD
Time-out List Offset	Next sequence offset
Wait Time for Time-out	
Loop Count & Jump Timing	%0xxxxxx (jump immediately)
Play Item Number	2..99 (MPEG Track) or 100..599 (Entries)
Selection #1 Offset	Played offset for between 1st and 2nd Entry on this track
Selection #2 Offset	Played offset for between 2nd and 3rd Entry on this track
:	
Selection #N Offset	Played offset for between Nth Entry and end of file on this Track

Figure VI.8 Multi default selection

**Time-out List Offset:**

Time-out List Offset is the offset of the List that is played after Time-out ie. after the Play Item has been repeated the number of times specified by Loop Control. If Time-out List Offset equals \$FFFF and the Wait Time has elapsed, one of the Selection #N Offset Lists is played randomly after Time-out.

Time-out will not occur if the play or wait period is terminated by valid user interaction.

**Wait Time for Time-out:**

Wait time is the time to wait after the Play Item is played the number of times defined by Loop Count. The value of Wait Time for Time-out uses the same definition as Play Item Wait Time of Play List.

**Loop Count & Jump Timing:**

This byte contains two fields, Loop Count and Jump Timing. The Loop Count defines the number of times to repeat the Play Item. Jump Timing defines the way in which play is terminated as a result of user interaction. It is recommended that this value is \$81 for a Play Item that contains one Still Picture without audio.

The definition of Loop Count and Jump Timing is given in Figure VI.9.

Figure VI.9 Definition of Loop Count & Jump Timing

Position	Field Name	Value	Value/Action
bit[0..6]	Loop Count	0 1..127	Infinite Loop count
bit[7]	Jump Timing	%0 %1	Stop playing Play Item and jump to the corresponding selection offset immediately. Wait until completion of the current repetition of the Play Item and jump to the corresponding selection offset.

**Play Item Number:**

This two-byte binary number contains the single Play Item Number which is to be played. It is coded in the same way as the Play Item Number in the Play List (see Figure VI.5).

**Selection #N Offset:**

Selection #N Offset is the offset of the list that is played when selection number N is selected. If this equals \$FFFF, the corresponding selection number is ignored.

**VI.5 Extended Selection List**

The Extended Selection List is only used in file PSD\_X.VCD.

The Extended Selection List contains all of the Selection List data plus additional data that is used by computer systems that use pointing devices for user interaction.

The first part of the Extended Selection List contains fields that are identical in form with the Selection List.

The additional data contains fields that define the rectangular Selection Areas for the picture referenced by the Play Item Number for this List. A scaled coordinate system is used such that the extreme upper left screen coordinate is 0,0 and the extreme lower right screen coordinate is 255,255.

Selection Areas are coded in a 4 byte field. This field is coded as follows:

- the first byte contains the binary coded upper-left X coordinate of the Selection Area
- the second byte contains the binary coded upper-left Y coordinate of the Selection Area
- the third byte contains the binary coded lower-right X coordinate of the Selection Area
- the fourth byte contains the binary coded lower-right Y coordinate of the Selection Area

The order of the Selection Areas in the Selection List determines the priority of the Selection Areas. The first Selection Area in the list has the highest priority.

The layout of the Extended Selection List is given in Figure VI.10.

Figure VI.10 Extended Selection List

Field Name	Size (Bytes)
Extended Selection List Header	1
Reserved	1
Number of Selections (NOS)	1
Base of Selection Number (BSN)	1
List ID	2
Previous List Offset	2
Next List Offset	2
Return List Offset	2
Default List Offset	2
Time-out List Offset	2
Wait Time for Time-out	1
Loop Count & Jump Timing	1
Play Item Number	2
Selection#BSN Offset	2
:	
Selection #(BSN+NOS-1) Offset	2
Previous List Selection Area	4
Next List Selection Area	4
Return List Selection Area	4
Default List Selection Area	4
Selection Area #BSN	4
:	
Selection Area #(BSN+NOS-1)	4

**Extended Selection List Header:**

This one-byte code identifies the beginning of the Extended Selection List and equals \$1A.

**Reserved:**

This field is defined to be the same as the field of the same name in the Selection List.

**Number of Selections:**

This field is defined to be the same as the field of the same name in the Selection List.

**Base of Selection Number:**

This field is defined to be the same as the field of the same name in the Selection List.

**List ID:**

This field is defined to be the same as the field of the same name in the Selection List.

**Previous List Offset:**

This field is defined to be the same as the field of the same name in the Selection List.

**Next List Offset:**

This field is defined to be the same as the field of the same name in the Selection List.

**Return List Offset:**

This field is defined to be the same as the field of the same name in the Selection List.

**Default List Offset:**

This field is defined to be the same as the field of the same name in the Selection List.

**Time-out List Offset:**

This field is defined to be the same as the field of the same name in the Selection List.

**Wait Time for Time-out:**

This field is defined to be the same as the field of the same name in the Selection List.

**Loop Count & Jump Timing:**

This field is defined to be the same as the field of the same name in the Selection List.

**Play Item Number:**

This field is defined to be the same as the field of the same name in the Selection List.

**Selection #N Offset:**

This field is defined to be the same as the field of the same name in the Selection List.

**Previous List Selection Area:**

This field defines the location of the Previous List Selection Area.

**Next List Selection Area:**

This field defines the location of the Next List Selection Area.

**Return List Selection Area:**

This field defines the location of the Return List Selection Area.

**Default List Selection Area:**

This field defines the location of the Default List Selection Area.

**Selection Area #N:**

This field defines the location of the Selection Area #N.

**VI.6 End List**

The End List is a List for terminating interpretation of the PSD. The structure of the End List is given in Figure VI.11.

Figure VI.11 **End List structure**

Field Name	Size (Bytes)
End List Header	1
Reserved	7

**End List Header:**

This one byte code identifies the beginning of End List and equals \$1F.

**Reserved:**

This field is seven bytes long. These bytes are reserved and set to zero.

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**Chapter VII User Data****VII.1 General**

On a VIDEO CD disc it is allowed to encode user\_data in the picture layer of the MPEG Video stream.

On a VIDEO CD disc all user\_data must use a tag field and a length field. The tag field indicates the usage of the user\_data.

User\_data can be used to encode scan information and closed caption information.

VII.2 Structure of User Data

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**VII.2 Structure of User Data**

On a VIDEO CD disc all MPEG user\_data must be preceded by a next\_start\_code() function with two zero\_bytes (see ISO 11172-2).

The general structure of all User Data on a VIDEO CD disc is given in Figure VII.1. The total length of all User\_data\_groups is maximum 64 Byte.

Figure VII.1 **General structure of User Data**

Field Name	Value	Size (Bytes)
zero_byte	\$00	1
zero_byte	\$00	1
user_data_start_code	\$000001B2	4
User_data_group #1		(Variable)
:		
User_data_group #N		(Variable)

**zero\_byte**

See the next\_start\_code() function in ISO 11172-2.

**user\_data\_start\_code**

See ISO 11172-2.

**User\_data\_group #N**

The user\_data\_start\_code is followed by a number of User\_data\_groups, the number #N is an ordinal number that identifies the User\_data\_group. The general layout of a User\_data\_group is given in Figure VII.2.

Figure VII.2 **General layout of a User\_data\_group**

Field Name	Size (Bytes)
Tag_name	1
U_length	1
U_data	(U_length) - 2

**Tag\_name**

This one byte code defines the usage of U\_data. The usage of the Tag\_name value is given in Figure VII.3.

Figure VII.3      **Usage of Tag\_name**

Tag_name value	Description
\$00 .. \$0F	Reserved
\$10	Scan Information
\$11	Closed Caption Data
\$12 .. \$FF	Reserved

**U\_length**

This one byte binary number defines the number of bytes contained in Tag\_name plus U\_length #N plus U\_data.

**U\_data**

This field contains the actual User Data.

**VII.3 Scan Information data**

It is recommended that the following Scan Information User\_data\_groups are included as user\_data in the picture layer of all Intra pictures. Scan Information data contains forward and backward pointers to Sectors that contain the start of an Intra picture. Scan Information data can be used for both Motion Pictures and Still Pictures.

If a VIDEO CD disc contains Scan Information data, then the file SCANDATA.DAT must be present in the directory EXT (see chapter III.2.6.3).

For Scan Information data, the layout of the User\_data\_group is given in Figure VII.4.

Figure VII.4 **Layout of a User\_data\_group for Scan Information**

Field Name	Size (Bytes)	Value
Tag_name	1	\$10
U_length	1	14
Previous_I_offset	3	
Next_I_offset	3	
Backward_offset	3	
Forward_offset	3	

**Sector Offset values**

The values of Previous\_I\_offset, Next\_I\_offset, Backward\_offset and Forward\_offset are encoded as a Sector Offset value. For an MPEG Audio/Video Track, the Sector Offset value of a Sector is the offset in Sectors from the start position of the Track, as given in the Table Of Contents. For a Segment Play Item, the Sector Offset value of a Sector is the offset in Sectors from the first Sector of the Segment Play Item.

The Sector Offset value is encoded as a six digit BCD number. The first byte of the Sector Offset value contains the Minutes fraction (0..99) of the Sector Offset value. The second byte of the Sector Offset value contains the Seconds fraction (0..59) of the Sector Offset value, in addition to this the most significant bit of the second byte must be set to %1. The third byte of the Sector Offset value contains the Sectors fraction (0..74) of the Sector Offset value, in addition to this the most significant bit of the third byte must be set to %1. A Sector Offset value of \$FFFFFF indicates that a Sector Offset value is not available.

**Previous\_I\_offset**

This field contains the Sector Offset value to the Sector that contains the first byte of the picture\_start\_code of the previous I-picture within the Track or the Segment Play Item.

**Next\_I\_offset**

This field contains the Sector Offset value to the Sector that contains the first byte of the picture\_start\_code of the next I-picture within the Track or the Segment Play Item.

**Backward\_offset**

This field contains the Sector Offset value to the Sector that contains the first byte of the picture\_start\_code of an I-picture 5..10 seconds backwards within the Track or Segment Play Item. If there is no start of an I-picture at a distance of 5..10 seconds backwards, then the Backward\_offset points to the start of the first I-picture in the Track or Segment Play Item.

**Forward\_offset**

This field contains the Sector Offset value to the Sector that contains the first byte of the picture\_start\_code of an I-picture 5..10 seconds forward within the Track or Segment Play Item. If there is no start of an I-picture at a distance of 5..10 seconds forward, then the Forward\_offset points to the start of the last I-picture in the Track or Segment Play Item.

VII.4 Closed Caption Data

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**VII.4 Closed Caption Data**

If Closed Caption Data is encoded as user\_data, then bit[3] in the Status Flags field of the file INFO.VCD (see chapter III.2.5.1) must be set to %1, else this bit must be set to %0.

Closed Caption Data can only be encoded for the MPEG Audio/Video Tracks on a disc.

If a VIDEO CD disc contains Closed Caption Data, then the file(s) CAPTnn.DAT (see chapter III.2.6.4) must be present in the directory EXT.

For Closed Caption Data, the layout of the User\_data\_group is given in Figure VII.5.

Figure VII.5 **Layout of a User\_data\_group with Closed Caption Data**

Field Name	Size (Bytes)	Value
Tag_name	1	\$11
U_length	1	
CC_user_data	(U_length) - 2	

**CC\_user\_data**

The CC\_user\_data must be encoded in an even number of bytes. The format of the CC\_user\_data is defined in EIA-608. The first CC\_user\_data byte corresponds with EIA-608 "character 1".

**Appendix I Definition of Character Set \$03**

**Note:** This appendix is normative.

If the Character Set Code (see Chapter III.2.4.1.2) equals \$03 the following figures define the meaning of the encoded characters.

**Figure A.I.1 8-Bit characters code structure**

	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0000	A set of 32 control characters  (C0)		SP	A set of 94 graphic characters  (GL)					A set of 32 control characters  (C1)		---	A set of 94 graphic characters  (GR)				
0001																
0010																
0011																
0100																
0101																
0110																
0111																
1000																
1001																
1010																
1011																
1100																
1101																
1110																
1111																

Note: C0: Refer to Figure A.I.3  
 GL: JIS Roman characters [14]\*, refer to Figure A.I.3  
 C1: Not allowed to use  
 GR: JIS Kanji 1990 [168]  
 ---: Inhibited to use

**Figure A.I.2 Type of characters expressed by character code**

C0	GL	C1	GR	Refer to Fig. A.1
Ref. Fig. A.3	JIS Roman character [14]*	-	JIS Kanji 1990 [168]*	By JIS X 0208

\*: Figures in [] are ISO 2022 registration numbers

**Figure A.I.3 Content of C0 and GL**

	0000	0001	0010	0011	0100	0101	0110	0111
0000	NUL	---	SP	0	---	P	---	p
0001	---	---	!	1	A	Q	a	q
0010	---	---	"	2	B	R	b	r
0011	---	---	---	3	C	S	c	s
0100	---	---	---	4	D	T	d	t
0101	---	---	%	5	E	U	e	u
0110	---	---	&	6	F	V	f	v
0111	---	---	'	7	G	W	g	w
1000	---	---	(	8	H	X	h	x
1001	---	---	)	9	I	Y	i	y
1010	LF	---	*	:	J	Z	j	z
1011	---	---	+	;	K	---	k	---
1100	FF	---	,	<	L	---	l	---
1101	CR	---	-	=	M	---	m	---
1110	---	---	.	>	N	---	n	---
1111	---	---	/	?	O	_	o	---

Notes: Columns 0000 and 0001 are referred to as the C0 characters.

Columns 0010, 0011, 0100, 0101, 0110 and 0111 are referred to as the GL characters.

---: Inhibited to use.

NUL: Special control character which does not have a special meaning. It fulfils the vacancy as well as the unused time and space. Only for time consuming.

CR: Special control character to put back the cursor to the left side. Usually, it is used in combination with LF and indicates the head of the next line.

LF: Special control character which moves the cursor to the next line.

FF: Special control character to scroll the lines forward. The last character is preserved during the movement. Then the cursor is moved to the start position of the next page.

SP: Maintaining the same line, the writing position is moved one character to the right. It can be recognized as default character.



**Appendix II VIDEO CD Identification**

**Note:** This appendix is not normative, but for information only.

To identify a VIDEO CD disc the following properties can be used:

- A. A VIDEO CD disc is a CD-ROM XA disc. In the Lead-in Area, the Table Of Contents contains PSEC=\$20 at POINT=\$A0. The Primary Volume Descriptor contains the CD-ROM XA Identifying Signature at Byte Position 1025.
- B. A VIDEO CD disc is a CD Bridge disc. The System Identifier in the Primary Volume Descriptor contains the string "CD-RTOS CD-BRIDGE". There is a subdirectory to the Root Directory with the name "CDI".
- C. The directory "KARAOKE", containing a record for the file "KARINFO.BIH;1" at sector 00:03:00, is specified from VIDEO CD specification Version 1.0 (published as KARAOKE CD Version 1.0) or higher. However, the directory "KARAOKE" and the file "KARINFO.BIH" are optional.
- D. The directory "MPEGAV", containing a record for the file "MUSIC01.DAT;1", is specified from VIDEO CD specification Version 1.0 on. Note that from Version 1.1 on the alternative file name "AVSEQ01.DAT;1" can be used.
- E. The start address of the file "MUSIC01.DAT;1" (or as an alternative "AVSEQ01.DAT;1" for Version 1.1 or higher) must be in Track 2, this is specified from VIDEO CD specification Version 1.0 on.
- F. The directory "VCD", containing a record for the file "INFO.VCD;1" located at sector 00:04:00, is specified from VIDEO CD specification Version 1.1 on.
- G. If the file "INFO.VCD;1" is present, a VIDEO CD identification string and the VIDEO CD Version number are located in this file.

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**Appendix III Interpretation of the PSD**

**Note:** This appendix is normative.

It is recommended that players interpret the PSD in the way described in this Appendix.

**A.III.1 Start of play from the PSD**

If a single disc is played and if the user starts play by selecting a valid List ID number from the LOT, the player will start to interpret the PSD at this List ID. Else the player starts interpretation at List ID #1.

If a disc from a multi disc Album is played and if bit[5] of the Status Flags field in INFO.VCD of the previous disc (in the same Album) is equal to %1, then start the disc at List ID #2 else start the disc with List ID #1. If playing the previous disc is ended by a user action, then start the disc with List ID #1.

**A.III.2 Interpretation of Lists**

The player reads the contents of the List. The type of List is determined by the List Header. The interpretation of the List can be interrupted by a User Interaction Function, see A.III.3.

**A.III.2.1 Play List**

If the list is a Play List, then:

- Starting at the beginning of the list of Play Items, then for each Play Item in order do the following:
  - Play the Play Item. If a Trigger Bit is set in the currently playing sector then pause the play for a time given by Auto Pause Wait Time and then resume play.
  - When the Play Item has played for a time given by Playing Time then stop play.
  - Wait for a time given by Play Item Wait Time.
- When all Play Items are complete, go to interpret the List given by Next List Offset.

**A.III.2.2 Selection List**

If the list is a Selection List or an Extended Selection List, then:

- Repeat playing the Play Item the number of times given by Loop Count. If a Trigger Bit is set in the currently playing sector then pause the play.
- Wait for a time given by Wait Time for Time-out.
- Go to interpret the List given by Time-out List Offset.
- If the Time-out List Offset equals \$FFFF, then go to interpret one of the Selection #N Offsets selected at random.

**A.III.2.3 End List**

If the List is an End List, then terminate interpretation and return to manual control of the player.

**A.III.3 User Interaction Functions**

The user may interact with the player by means of user interaction functions.

There are five User Interaction Functions for Playback Control:

- NEXT function
- PREVIOUS function
- DEFAULT SELECTION function
- RETURN function
- NUMERIC function

User Interaction Functions are events that are initiated by user interaction. The exact nature of the user interaction is player dependent, but all playback systems must be capable of implementing the five functions e.g. by dedicated keypads or by some combination of pointing device and keypads.

The player actions in response to the User Interaction Functions are described below.

**A.III.3.1 NEXT function****At Play List**

Stop playing the current Play Item or terminate the current wait state. If there are any remaining Play Items on the Play List then play the next Play Item, else go to interpret the List given by Next List Offset.

**At Selection List**

If the Next List Offset is not equal to \$FFFF, then stop playing the Play Item or terminate the current wait state and go to interpret the List given by Next List Offset.

**A.III.3.2 PREVIOUS function****At Play List**

If there are any previous Play Items on the Play List, then stop playing the current Play Item or terminate the current wait state and play the previous Play Item. Else if the Previous List Offset is not equal to \$FFFF, then stop playing the current Play Item or terminate the current wait state and go to interpret the List given by Previous List Offset.

**At Selection List**

If the Previous List Offset is not equal to \$FFFF, then stop playing the Play Item or terminate the current wait state and go to interpret the List given by Previous List Offset.

**A.III.3.3 DEFAULT SELECTION function****At Play List**

Do nothing

**At Selection List**

If the Default List Offset is not equal to \$FFFF, then stop playing the Play Item or terminate the current wait state. If Default List Offset equals \$FFFD or \$FFFE, then interpret the Multi Default Selection List as defined in chapter VI.4, else go to interpret the List given by Default List Offset.

**A.III.3.4 RETURN function****At Play List or Selection List**

If the Return List Offset is not equal to \$FFFF, then stop playing the Play Item or terminate the current wait state and go to interpret the List given by Return List Offset.

**A.III.3.5 NUMERIC function****At Play List**

Do nothing.

**At Selection List**

Stop playing the Play Item or terminate the current wait state. If Default List Offset equals \$FFFD, then the NUMERIC function is disabled, else play the List with the Selection number corresponding to the User Selection (either numerical or by pointing device).

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**Appendix IV Preferred Key Assignment**

**Note:** This appendix is not normative, but for information only.

All the User Interaction Functions may be assigned to actual keys. For example,

- |    |                   |                                |                  |
|----|-------------------|--------------------------------|------------------|
| 1. | NEXT              | Next (>> ) Key                 |                  |
| 2. | PREVIOUS          | Prev ( <<) Key                 |                  |
| 3. | DEFAULT SELECTION | Play (>) Key                   | [Select Item]    |
| 4. | RETURN            | Stop Key or Special Return Key | [Return to Menu] |
| 5. | NUMERIC           | 0,1,2,3,4,5,6,7,8,9            |                  |

The NUMERIC function is necessary for menu selection and direct playing by List ID. List ID has a range from 1 to 32767. For cost and size reduction numeric keys are not necessary but the NUMERIC function is always necessary. In that case other types of input method must be available for the NUMERIC function, such as ordinary menu selection by pointing device.

As an optional feature it is also possible to select a Play or a Selection List by user input of List ID number.

The menu pictures that are displayed by the Selection Lists should indicate the numbers of the selections that are available to the user for numeric selection.

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**Appendix V    Menu Selection by highlighted area**

**Note:**    This appendix is not normative, but for information only.

As an optional feature, menu pages can be authored such that one of the selection items is highlighted and the user can select this item by the Default Selection function. In case of this type of menu, each menu is prepared with as many menu pages as there are selection items. Only one of the selection items is highlighted sequentially in each menu page and the Default Selection Offset is set to link the corresponding list for the highlighted item. If the user uses the Next or Previous function, the current menu page is changed and so the highlighted item is changed. It looks to the user like changing the selection item by use of the Next or Previous function.

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## Appendix VI Basic concept of the PSD

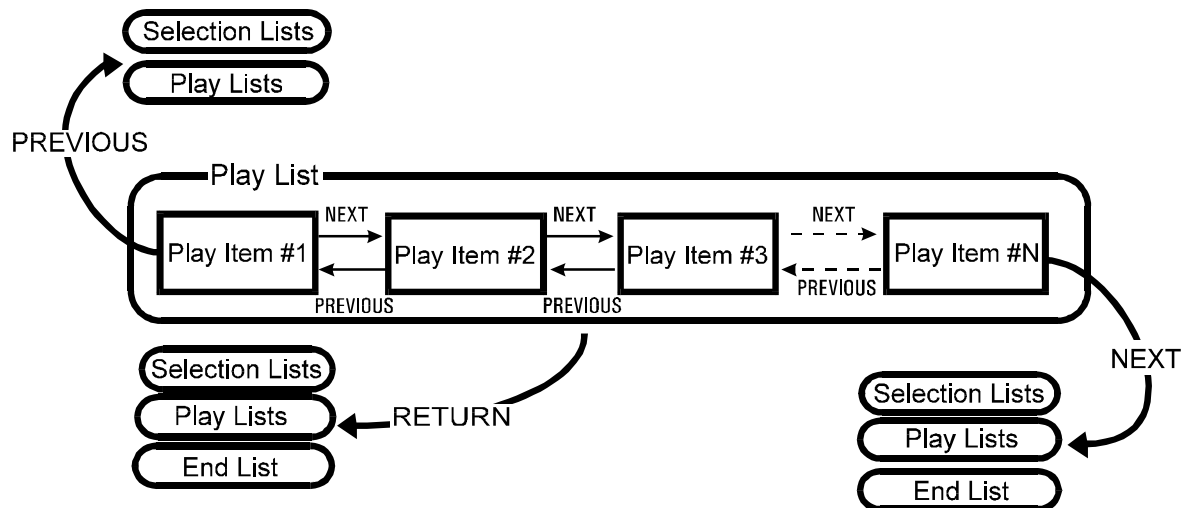
**Note:** This appendix is not normative, but for information only.

### Play List

Figure A.VI.1 shows the basic concept of the Play List.

- \* A Play List contains Play Items. These Play Items can be chosen by means of the NEXT and the PREVIOUS functions.
- \* If the NEXT function is executed on playing the last Play Item, or the PREVIOUS function is executed on playing the first Play Item, or the RETURN function is executed, then other lists will be played.

Figure A.VI.1 Basic concept of the Play List

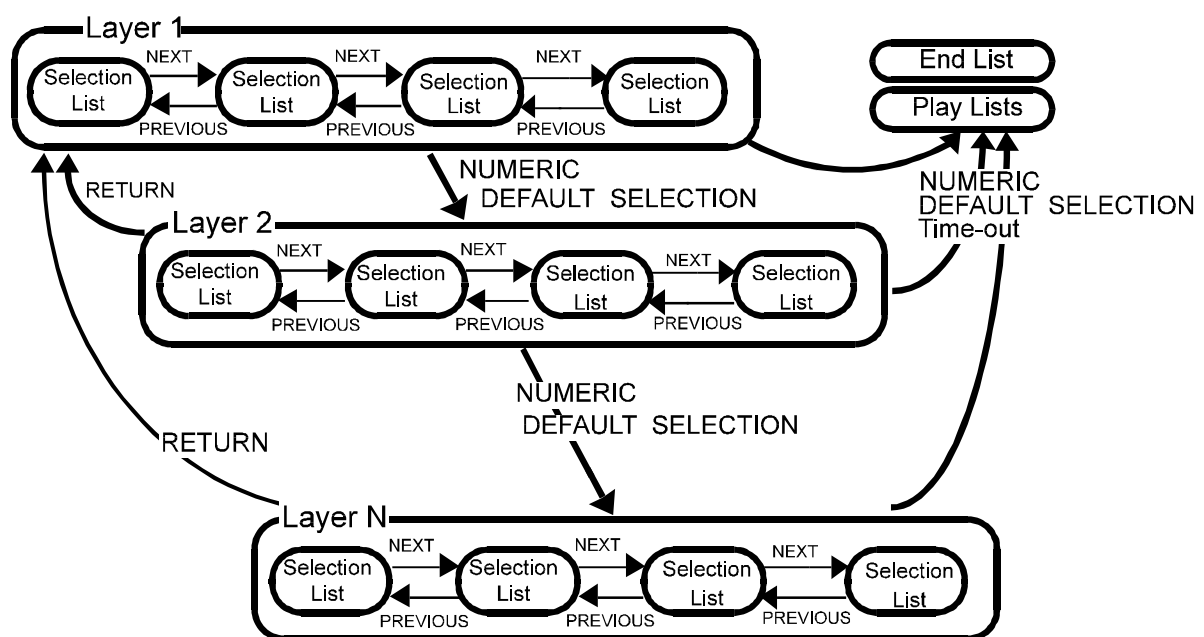


**Selection List**

Figure A.VI.2 shows the basic concept of the Selection List.

- \* A Selection List is used to display menus.
- \* Hierarchical menus are available. In this case, to select a menu in an other layer, a NUMERIC or DEFAULT SELECTION function is executed.
- \* A next or previous menu indicated by a Selection List is selected on executing the NEXT or PREVIOUS function respectively.
- \* A Play List or End List will be played on executing Numeric, Default function or Time-out.

Figure A.VI.2 Basic concept of the Selection List

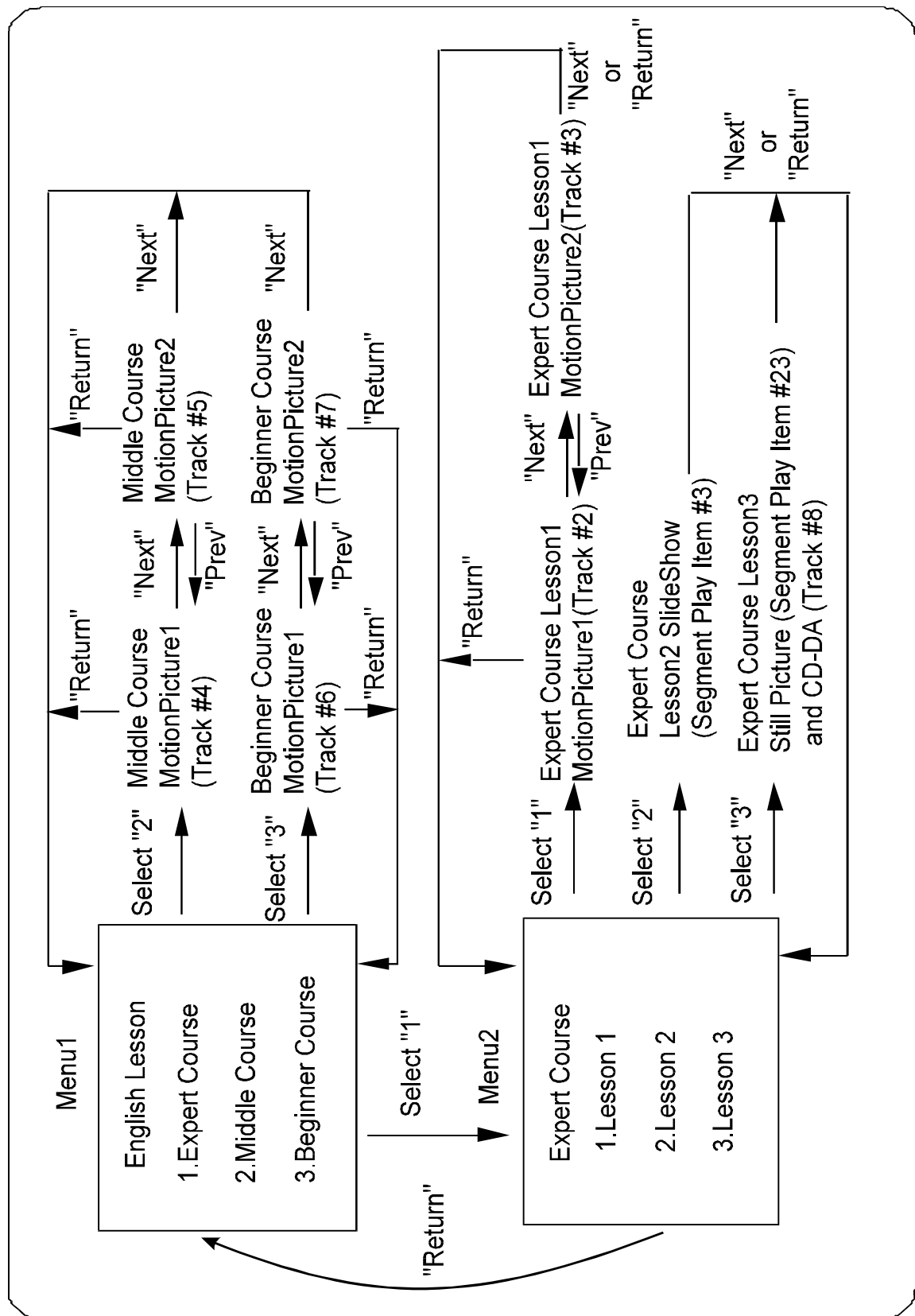


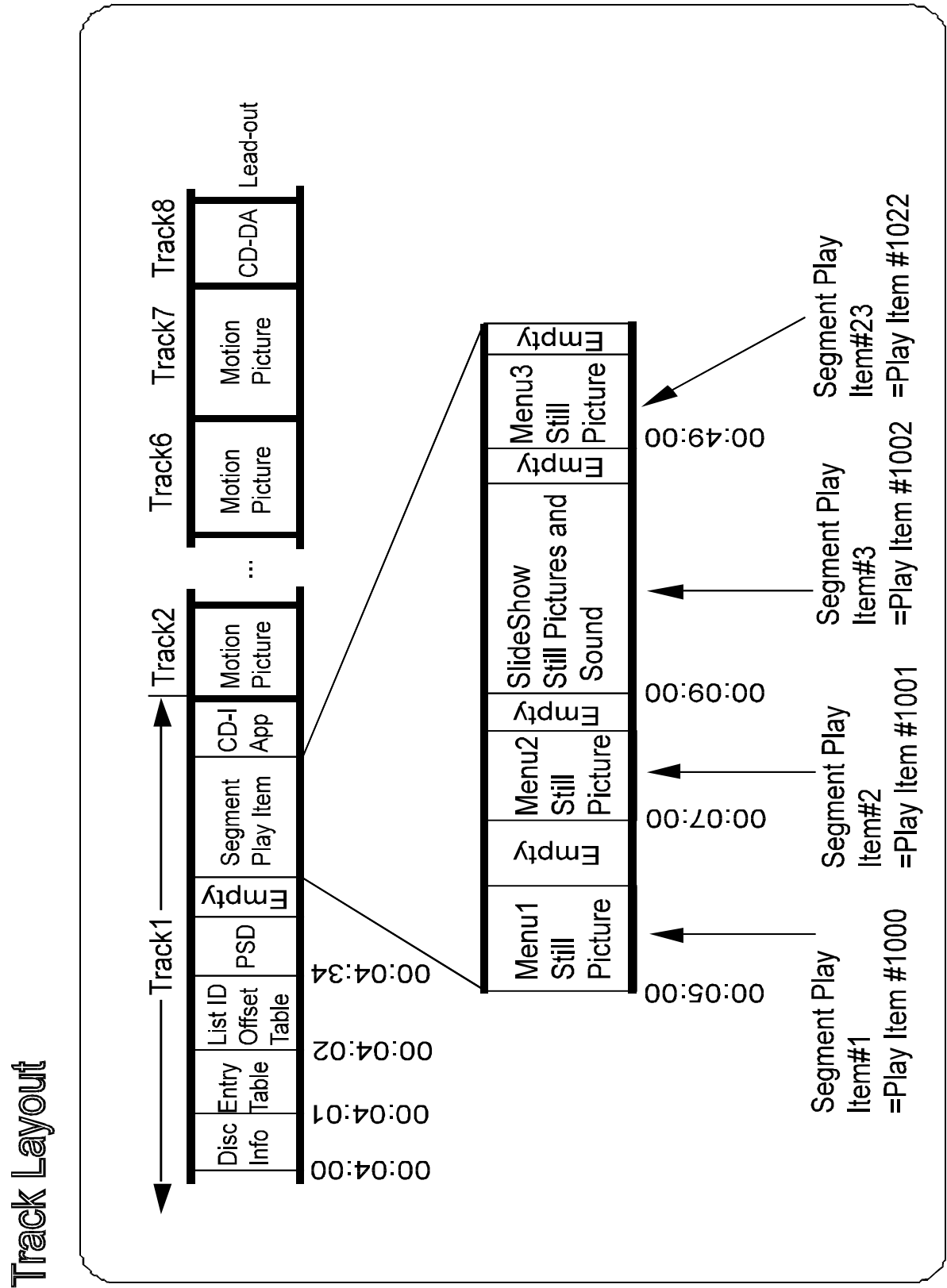
**Appendix VII Example of playback control**

**Note:** This appendix is not normative, but for information only.

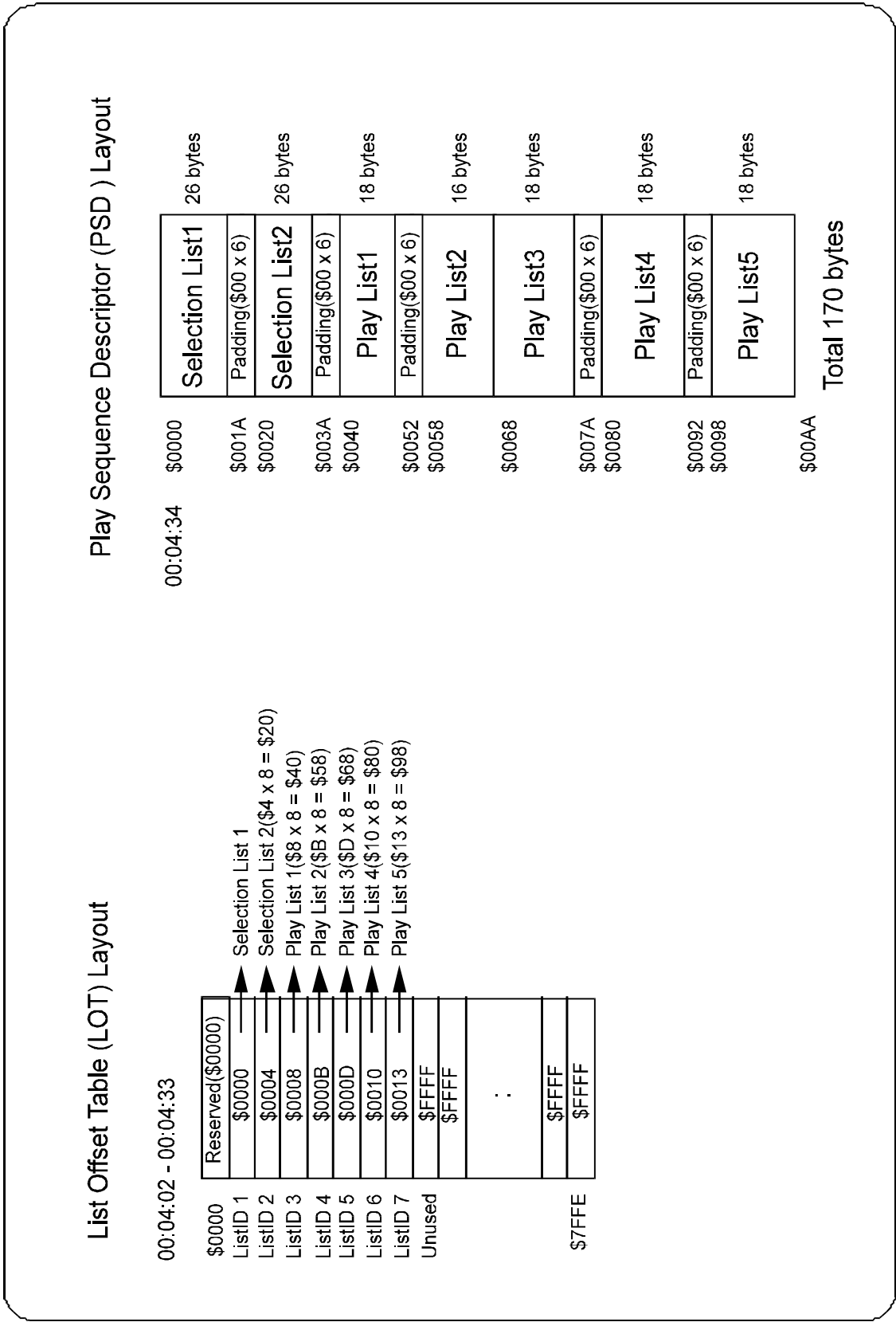
In this Appendix, an example of an English lesson by means of the PSD is given.

## Flow chart



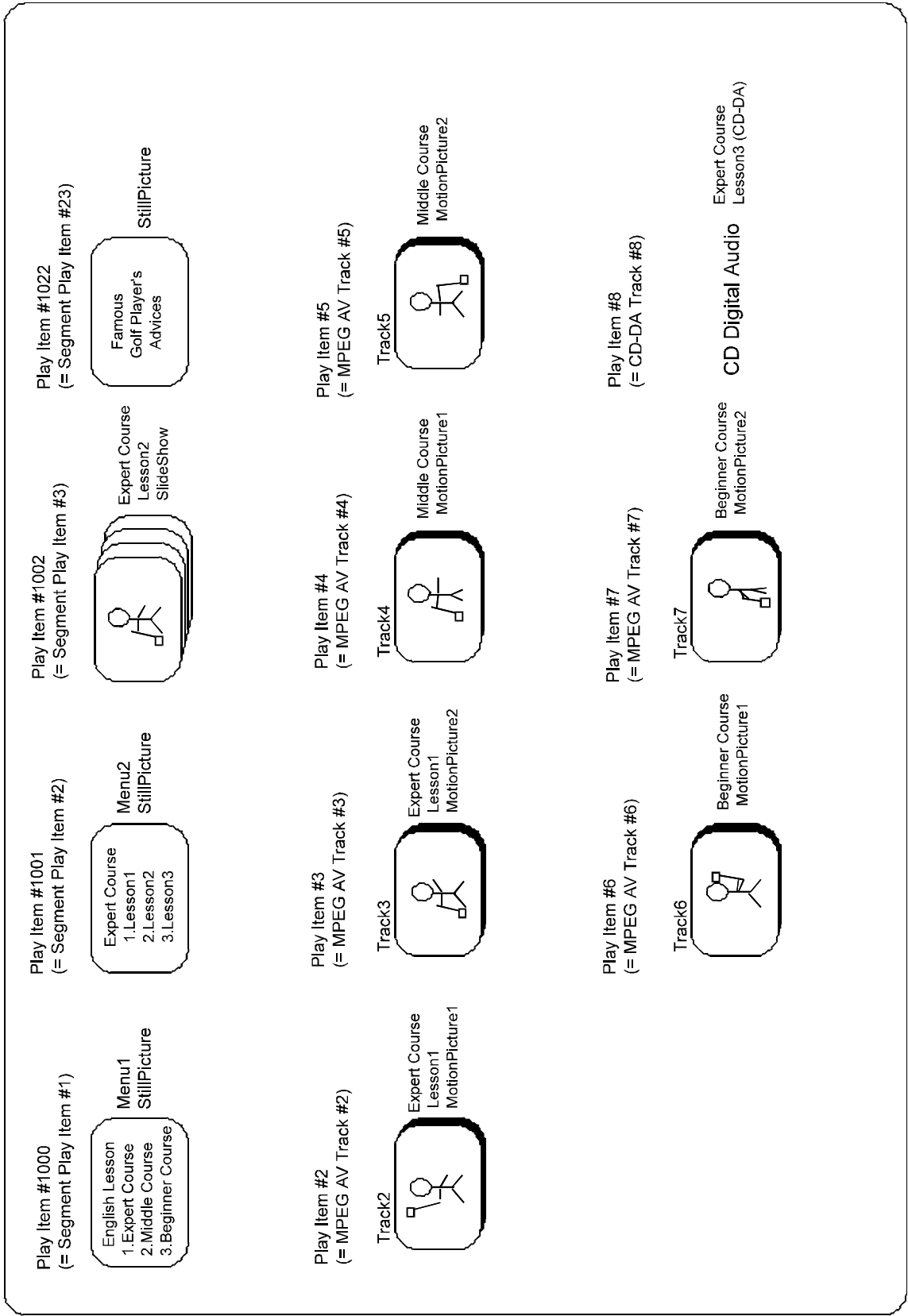


LOT and PSD Layout

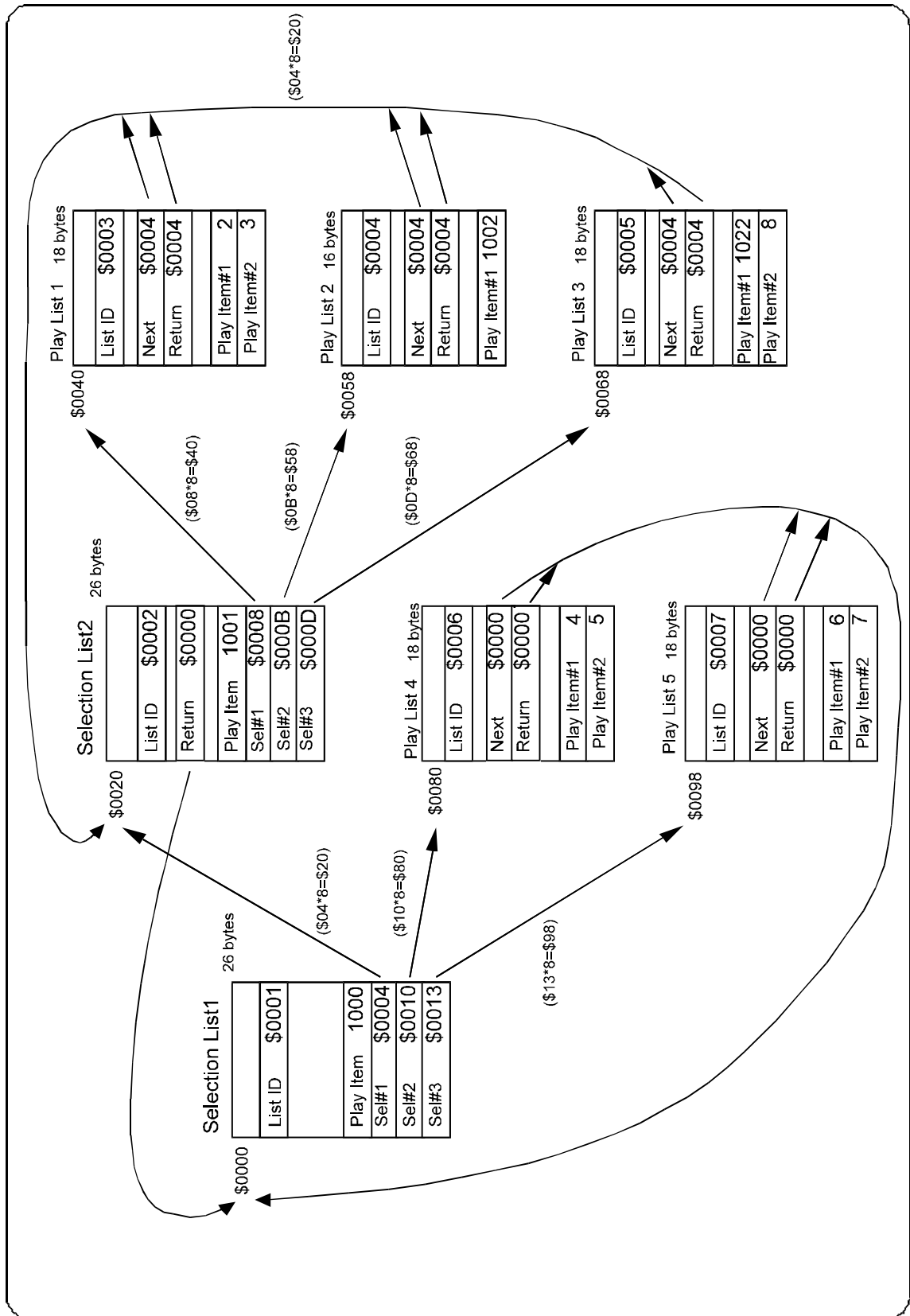




Play Items Contents



## PSD Link Layout



**Appendix VIII Application notes**

**Note:** This appendix is not normative, but for information only.

**1. Accuracy of the Auto Pause function**

It is recommended that the accuracy of the Auto Pause function is  $\pm 10$  frames of the picture specified by the trigger bit.

**2. Transition time for menu change**

Menus with highlighted areas which include many selection items will require longer update times. The update time will depend on the player performance.

**3. Play Item Wait Time and Auto Pause Wait Time**

The Play Item Wait Time and the Auto Pause Wait Time as defined in chapter VI do not include other factors like the player's access time.

**4. Resolution change**

A change in resolution from a Normal Resolution Still Picture to a High Resolution Still Picture can cause a momentary blanking of the screen.

**5. Slide show used for selection menu**

In order to avoid unexpected pictures after fast forward in a slide show, it is recommended to insert a Still Picture for a menu in the last two segments.

**6. Picture change method for High Resolution Still Pictures**

High Resolution Still Pictures can be displayed by overwriting the previous picture.

**7. Memory size of a VIDEO CD player**

A VIDEO CD player can be designed with 6 KByte (3 Sectors) memory. One Sector for INFO.VCD, one Sector for ENTRIES.VCD and one Sector for the PSD.

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## Changes and Remarks

**Changes from VIDEO CD SPECIFICATION Draft Version 2.0  
to VIDEO CD SPECIFICATION Version 2.0**

The main changes from VIDEO CD Draft Version 2.0 to VIDEO CD Version 2.0 are:

- The VIDEO CD SPECIFICATION Version 1.1 and the VIDEO CD SPECIFICATION Draft Version 2.0 are combined into one document.
- Support for Closed Caption encoding on video line 21 is added.
- Extended Play Sequence Descriptor files (PSD\_X.VCD and LOT\_X.VCD) are added with support for hot-spot areas on menu screens.

Due to the fact that two documents are combined into one, a line by line comparison of the VCD Version 2.0 document with the VCD Draft Version 2.0 document is not possible. For this reason only global changes are given.

The page numbers in the list refer to the page numbers in the VIDEO CD Version 2.0 Specification.

Page	VCD Draft Version 2.0	VCD Version 2.0	Remarks
I-1	--	EIA-608: Recommended ...	Reference added.
II-2	Figure I.1	Figure II.1	Figure changed.
II-4	--	Figure II.2	Figure added.
III-3	Figure II.2	Figure III.1	Figure changed.
III-18	Chapter IV.1, Status Flags	Figure III.15, Status Flags Bit 3, 4	Support for Closed Caption added.
		Bit 5, 6	Improved support for multi disc albums.
		Bit 7	Extended PSD added.
III-24	--	EXT directory	EXT directory added with PSD_X.DAT, LOT_X.DAT, SCANDATA.DAT and CAPTnn.DAT.
IV-3	--	Chapter IV.2.1.1	Support for line 21 modulation added.
IV-3	--	Chapter IV.2.1.2	Chapter added.
V-2	Figure III.1	Figure V.1, V.2	Figure changed. Track #2 or higher is specified in chapter IV.
VI-2	Chapter IV.3	Lists in PSD.VCD can not cross Sector boundaries.	Specification added.
VI-4	Chapter V.3	List ID	Specification for bit[15] added.

Changes and Remarks

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Page	VCD Draft Version 2.0	VCD Version 2.0	Remarks
VI-11		Chapter VI.5 Extended Selection List	Chapter added.
VII-2	--	Chapter VII.2 Structure of User Data	Chapter with general specification for user_data added.
VII-6	--	Chapter VII.4 Closed Caption Data	Chapter added.
A VI-1	--	Basic concept of the PSD	Appendix added.
A VII-1	--	Example of playback control	Appendix added.
A VIII-1	--	Application notes	Appendix added.